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THESIS

Packaging Case Studies--Folding Or Set Up?

by

John Peter Alevizos

(B. S. in B. A. Boston University 1948)

Submitted in partial fulfillment of  
the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION







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TO MY WIFE



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## FOREWORD

### Business is Built on Boxes

Business---the exchange of goods---requires packaging. Goods must be not only planned and produced but packaged as well. Perhaps, in prehistoric times, if a cave man made a better bone hook or spear than his neighbor they would come to him, and after barter, carry it away. Now, however, the day of beating a path for the better mouse-trap has passed. Products today must be packaged to meet the market. While packaging is of many kinds, the vast multitude of packaging needs are met best by paper boxes. They are a cornerstone of commerce without which business would find itself in chaos. They offer business an essential threefold service; shipping, selling and storing.

Boxes not only make possible the continuance of existing commerce but in many instances increase its volume. Many business houses have been built to sizeable proportions on the increased volume created by boxes. The well-designed and appropriate box significantly enhances the saleability of the product. Not only does it fix firmly in the public mind the product's identity but it provides a potential sales weapon in its large, versatile display space. There are but a few products that do not lend themselves to the perfect packaging possibilities of the paper box. From clothing to cosmetics or tobacco to toys, the paper box gives service to the business world.





### Introduction

The post war clamor for mass produced goods has subsided. Today, mass producers are waging a free-for-all battle for sales.

With the return of competitive buying, manufacturers and wholesalers in many lines of endeavor, all over the country, are cudgeling their brains and spending their cash on plans for better presentation of their merchandise.

The sale of more brand name merchandise through more retail outlets to more consumers than at any period heretofore is no longer an ambition of American marketing leaders---it is now a reality.

Attractive and compelling packages, all but forgotten during the critical war years, have now reached a position of prime merchandising importance.

The rejuvenation of the package as a selling tool in our post war economy has naturally rekindled controversies native to the packaging industry.

One of the least discussed, yet one of the most evident, is the present though silent competition between the folding paperboard box and the set up paperboard box.

Spokesmen of the folding carton field have devoted little in the way of printed discussion on the relative position of the two. This complacency is attributed to the steady and remarkable increase in both unit production and dollar volume of folding cartons during the past

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FROM : THE CHIEF OF STAFF

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decade. On the other hand, set up box manufacturers are well aware of a distinct, decreasing trend in unit production of their product. This is attributed mainly to a steady switching from set up to folding. Rather than going after the lost business, set up manufacturers devote themselves generally to maintaining their position by increased concentration on boxes of more intricate construction and design, which command higher selling prices. Their policy of specialization, coupled with the advent of the transparent container, has brought about a remarkable increase in their dollar sales volume even though unit production has fallen off.

It is not the writer's purpose to show that the great increase in folding carton business is due solely to an influx of set up business, nor that folding cartons fit into our economic system better than set up boxes. Both styles theoretically have definite positions in our marketing structure. The steady advancement of folding carton business is accounted for to a large extent by the influx of set up business, though probably to a greater degree through the promotion of new packaging fields.

The problem to which this thesis will be confined lies in the economic and marketing advantages and disadvantages present by the preference of one form over the other. In short, it will be the objective of this thesis to attempt to define the economic position of both folding and set up





boxes in the packaging field.

To fulfill the objective of this thesis, the writer will attempt to present an exhaustive description of each form of paperboard carton. By discussing the advantages and limitations of each and portraying the different styles within each form, a basic yet well-rounded understanding of folding and set up boxes should be reached. Then, a historical analysis should provide a picture of the comparative development of both forms, as well as a statistical portrayal of the position each holds in our economy. With this knowledge in hand, a presentation of the problems encountered by concerns faced with the decision as to which form to select for their products, theory and practical experience will be combined to provide a more thorough understanding of the problem at hand. With all this then, it is felt that an answer closer to the truth may be developed in the concluding analysis of this presentation.



## I. THE FOLDING BOX

### A. What is a Folding Box?

Before entering into a discussion covering the importance and advantages of folding boxes, it might be well to define specifically the kind of boxes that are being discussed. Folding boxes as used herein are boxes made from bending paperboard varying in thickness from about .012 to .060 of an inch. These boxes are shipped flat or knocked down flat to the buyers so that they must be set up either by hand or by machine before or at the same time they are filled. After filling, they are closed by locking or sealing the flaps with glue.

### B. Extent of Use

To appreciate the vital part that paperboard containers, in general, and folding boxes in particular, play in the nation's economy, the following table showing the number of paperboard containers used per day in 1947 is cited.

Table I. PAPERBOARD CONTAINERS USED PER DAY

<u>Types of Containers</u>	<u>Number Used Per Day in 1947</u>
Folding Cartons.....	223,500,000
Set Up Boxes.....	17,500,000
Fibre Cans and Tubes.....	7,200,000
Corrugated & Solid Fibre Boxes.....	17,100,000
Total.....	<u>265,300,000</u>

Fibre Containers, August, 1948 p86.

# THE HISTORY OF THE

## REPUBLIC OF THE UNITED STATES

The history of the Republic of the United States is a story of growth and development. It begins with the first settlers who came to the shores of the New World, seeking a new life and a new land. They found a land of vast resources and a people who were brave and free. The story of the Republic is a story of the struggle for freedom and the pursuit of happiness. It is a story of the men and women who have shaped the destiny of the Nation, from the first settlers to the present day. The Republic has grown from a small colony to a great Nation, and its history is a testament to the power of the American dream.

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11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50



"In 1947 the figure of 96.8 billion cartons was equivalent to about 265 billion containers per day, or equivalent to over 1.8 containers per day for every man, woman and child in the country." (1)

The same analysis applied to folding cartons reveals that in 1947, every man, woman and child in the U. S. used one and a half folding boxes per day.

It is difficult for many to conceive that the figures on usage are as large as they are, but they are understood when it is considered that practically every item we consume requires a box. Thus, as we move through the day most everything we touch and consume involves the consumption of at least a part of a box.

The fulcrum upon which the folding paper box elevated itself to its present lofty position in the packaging field is mass production. As American industry reached its maturity in the last century, mass production of consumer goods required a package which would deliver these goods to consumers throughout the country in uniformly satisfactory condition which would unmistakably identify the brand of the product and which could itself be mass produced. That package is the folding paper box. The box industry has grown with the development of America and today the folding box retains a pre-eminent place as a low cost mass production

(1) Fibre Containers, August, 1948, p104.



package. Sales of folding boxes during the year 1947 totaled \$455,702,500. (1)

### C. Variety of Styles

Infinite variety, as can be seen in the illustrations on the pages which follow, is the most notable characteristic of the folding paper box. Literally hundreds of variations in style and construction have been developed to meet the varying merchandising needs of the great assortment of products packaged. However, the illustrations in the ensuing section cover most of the important styles of folding boxes.

The almost limitless number of styles, in itself an advantage, has on the other hand caused endless woe to mass producing manufacturers. Because of patent restrictions, not all of these can be manufactured by any one company. Patented cartons have been so designed that any information on the patent or for the purchase of a particular style, a prospective user must go to that particular manufacturer claiming the patent rights.

The number of styles in which a box may be constructed is limited only by human ingenuity. It is difficult to conceive of any packaging quality or property which cannot be built into a folding box, and it is equally difficult to

(1) National Paperboard Association, Paperboard Industry Statistics, 1947.





conceive of any product for which the folding box is not a satisfactory package.

#### D. Paperboard Properties

In addition to styles in construction, other factors offer the user of folding cartons a wide choice. Paperboards, for example, come in a variety of grades, colors and thicknesses. The carton may be printed in a number of colors by either letterpress or lithography. A variety of special treatments either of the board or the printed carton may give it specially desired characteristics. Varnish, lacquer, paraffin or cellulose film may be applied or the board may be embossed.

"Certain grades of board are in common use for folding and set up boxes. Paperboard is made up of different materials and come in different thicknesses, dependent upon the size and style of the box and the exact packaging use to which it will be put." (1)

Table II lists the grades of paperboard and the materials from which they are most commonly made.

"Waste papers, chief source of raw materials, are sorted into many classes, each commanding a different price, according to the fibre content. Papers containing strong white fibres bring the highest price and from there range downward to mixed papers, the lowest class. Pulp, although the average in use is less in volume, is an important element in many furnishes in producing the quality and surface effect required. There are three kinds of

(1) Whiting, Grafton, Packaging Catalog, 1945, New York, N.Y., Breskin & Charlton Publishing Company, pp 130-1



Table II.

GRADES OF PAPERBOARD  
Used in the Manufacture  
Of Folding Boxes

	F	U	R	N	I	S	H								
	W	A	S	T	E	P	A	P	E	R	S	P	U	L	P
Caliper Range In Inches	Mixed Papers	New Ground Wood	Sul- phite Fibres	Old Con- tainers	Sul- phite Fibres	Old Con- tainers	Sul- phite Fibres	Old Con- tainers	Sul- phite Fibres	Old Con- tainers	Sul- phite Fibres	Old Con- tainers	Sul- phite Fibres	Old Con- tainers	Sul- phite Fibres
Chip (Bending)	.012--.050	x	x												
Mist Gray Suit Board	.012--.050	x	x	x											
Manila Lined Chip	.012--.050	x	x	x											
Bleached Manila Lined Chip	.012--.050	x	x	x											
Kraft Board	.012--.050														
White Patent Coated News	.012--.028	x	x	x											
Clay Coated Board	.012--.028	x	x	x											
Bleached Sulphite Board	.012--.028														

ibid, p 131. Note: The proportion and selection of raw materials in a furnish may vary depending on availability of supply and quality desired.





pulp in common use: namely, sulfite, sulfate or kraft and ground wood. These may be bleached or unbleached and prices will vary accordingly." (1)

#### E. Printing Qualities

All the general advantages of unit packaging---convenience, protection, brand identification, standard of quality, guarantee of an honest measure, defense against substitution, ease in handling, and display---are present in the folding paper box. In addition, it has certain specific characteristics which make it attractive to a wide variety of consumer goods. One of these is its adaptability to high quality printing, which can greatly enhance the sales appeal of its product. Consumer sales can be generated by an efficiently printed design. A combination of good printing and an appealing package design is an effective lure of impulse buying. It is this attribute in the folding paper box that has inspired many marketers to say that packages are "silent salesmen".

Since paperboard is made from a combination of materials it is readily possible to produce a boxboard with a fine white printing surface on one side and an economical filler on the other. Whereas other packages may be decorated with labels and other similar materials, folding cartons

(1) *ibid.*, p 131.

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MEMORANDUM

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assume the printing as an integral part of themselves.

#### F. Quality Impression

Although the set up box, because of its inherent advantage of rigidity and its adaptability to expensive wrappings, can create the impression of quality much better than the folding box, the folding box still lays authentic claims in portraying impressions of quality.

Albert Knerr, Container Corporation of America's renowned artist and package designer, has simulated leather, velvet and other expensive set up box wrappers in his package designs that have amazed the most critical packaging experts. A particular example of this was shown to a large eastern concern by Mr. Knerr. This company had been packaging an expensive article in a leather bound case. Mr. Knerr claimed that he could produce the same quality effect and the same, if not better, protective construction in a folding box. The challenge was accepted. Today, this article that had been retailed in a leather bound set up box for years is now being transported, displayed and sold in an attractive folding box with a "leather" printed effect.

This particular instance is not cited to prove that the folding carton is superior to the set up box. Not in the least. It is cited to show that folding cartons are adaptable and flexible enough to suit a wide latitude of con-





ditions. In the particular case cited, the main advantage secured was not only the ability to match the set up in strength and design, but also to give the customer an efficient and attractive box at a more economical price.

#### G. Product Visibility

If the consumer is interested in looking at the contents of a package and if opening it is not feasible, the folding carton has a particular advantage. "Windows" may be cut out of the box during its fabrication and transparent lumarith or cellophane applied in a high speed operation. The resulting package has the rigidity and protective strength of the carton plus a high degree of visibility.

#### H. Laminated & Waxed Cartons

There are several processes by which parchment, glassine, tinfoil and other materials may be applied to a folding box to provide it with greaseproof qualities. The material may be impregnated in the board or retained as an outer layer through a laminating process. The parchment, glassine or similar material is laminated to the paperboard by a micro-crystalline, amorphous wax (or other adhesives) which provides the carton not only with greaseproof but moisture proof qualities as well.

Bakery cartons constructed of laminated greaseproof paperboard with moistureproof cellophane "windows" have been

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known to keep bakery products as fresh a week later as the day the product left the oven. Bakery cartons of such construction provide both protection to the product and increased saleability of the product.

A principal development of the folding box has been the water-vaporproof container used to package butter, lard, fish and many frozen foods. Wax coated or wax saturated paperboard provides this resistance to moisture, and enables the carton to retain its strength and shape en route to the consumer's kitchen. Paraffined cartons also provide substantial "water-vaporproofness" and "gasproofness", thus retaining freshness in the packaged product while resisting permeation by odors at the same time.

There are no limitations in the printing of paraffined cartons because the box blank is first printed and then coated or saturated with a transparent wax. In most cases, the wax coating adds a lustre and a better appearance to the carton.

Another quality or property of folding cartons lies in the fact that paperboard may be manufactured so as to provide an excellent outer surface for printing a clear design, and an inner surface that will not harm the product packaged. This particular feature is best exemplified by the solid bleached sulphite board used in the manufacture of linerless ice cream cartons. Linerless ice cream cartons are further

The first part of the report deals with the general situation of the country and the progress of the work during the year. It is followed by a detailed account of the various projects and the results achieved. The report concludes with a summary of the work done and the plans for the future.

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The tenth part of the report contains a list of the various projects and the results achieved. It is followed by a detailed account of the various projects and the results achieved. The report concludes with a summary of the work done and the plans for the future.



treated with a special, high-gloss, hard-surface wax on the inner surface to protect the product. The outer surface is treated with a lighter, egg-shell wax coating which affords adequate protection against attack by moisture from the outside. (1)

### I. Display-Selling Impact

There are literally hundreds of styles of folding cartons which offer complete protection to their products while in transit, and then on the retailer's counter are converted into attractive displays which invite impulse purchases on the part of customers.

A good package is measured by its selling impact--not by artistic beauty. The final decision as to whether a package is good or bad is made at the point of sale. That is the only place where package design can be tested. Success in the market place is proof of good package design even if it violates every known principle of artistic design. Because of an infinite variety of styles to choose from, printing as an integral part of the folding carton, rigidity in construction, display features, strength and protection, a package designer with the qualifications of a sales engineer has a wide choice of features to design a box that will incorporate that selling impact---so vital in today's competitive retail market.

(1) Lyons, Owen E., Packaging Catalog, 1945, New York, N. Y., Breskin & Charlton Publishing Company, p 144.

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## J. Standardization

Another major feature of the folding carton is its standardization. Like any other mass production product, it is manufactured by precision methods and with very close tolerances. This fact is especially important to large scale packagers who use high speed filling machinery, Standardization is also important for the efficient operation of production-pacing, automatic box forming machines such as the Klik Lok, General Mills and Brightwood.

Automatic box forming machines are known to operate at speeds of from 60 to as high as 200 boxes a minute. High speed box forming machines are ingenious and simple. They have relatively few parts, and most of these are fully exposed for rapid adjustment. Some form boxes by glueing and stapling, others by self-locking features of the box blank itself. The important consideration here is that each die-cut blank is precisely uniform in size, shape and caliper.

Rigidity, the prime advantage of the set up box, is emulated by the types of carton blanks used in the Klik Lok, General Mills and Brightwood box forming methods, samples of which are displayed on the following inserts. Rigidity in this type of folding box is certainly equal, if not superior, to the rigidity attained in the average set up box. Of course, in the case of the Klik Lok blank you have the disadvantage of an irregular outer surface which is not con-





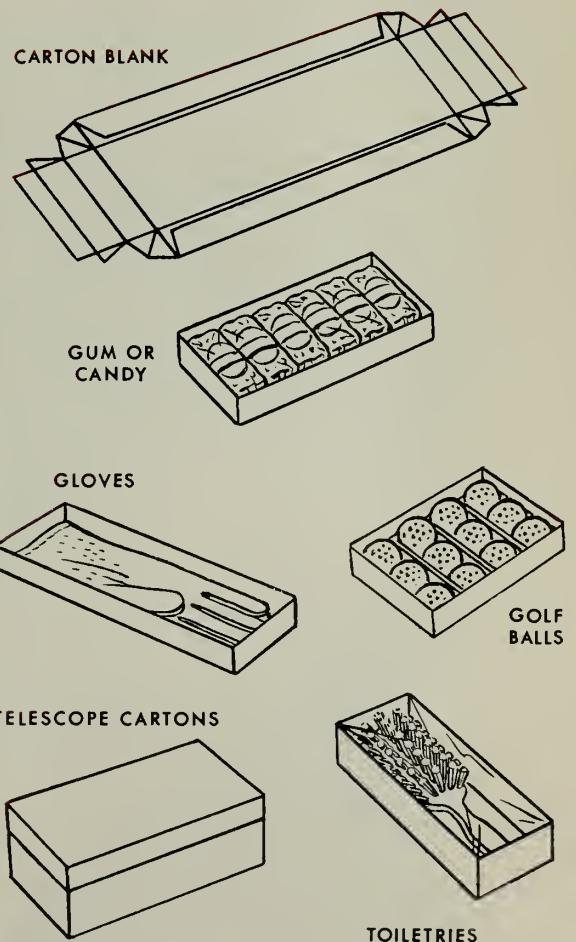
# General Mills

## Finished-Edge Carton Set-up Machine

### MODEL A

Automatically sets up open top double-wall trays or cartons from die-cut blanks. Trays are turned out with all four edges finished. They may be used as is, or as tops and bottoms of telescope boxes. These are widely used for packaging candies, pharmaceuticals, cosmetics, frozen meats and fish, pre-packaged meats and foods, rubber and

sporting goods. They make excellent counter display boxes for candy bars, chewing gum and other products packed in small individual packages. The web corner construction of the finished edge carton prevents leakage when packing fish, frozen food, etc. Cartons are neatly squared, have sturdy, straight sides and hold their shape perfectly.



### IT'S FULLY AUTOMATIC

Requires no operator—one person can supply carton blanks to several machines and assist with the filling operation besides.

### IT'S FAST

Speeds of up to 90 cartons per minute are possible. Two speed ranges are available: 40-90 cartons per minute, and 20-50 cartons per minute.

### IT'S FLEXIBLE

Handles any size carton from 2" to 7" in width, 4" to 14" in length and 1" to 2¾" in height. Maximum size of carton blank, 11" by 20". Change-over from one size to another is a simple 10-minute job of replacing the mandrel and carton former. Your present carton can easily be redesigned to conform to the machine's requirements without altering capacity or style.

### IT'S MECHANICALLY SIMPLE

Carton magazine holds approximately 400 blanks which are automatically fed and mechanically aligned. Cartons are set up by a vertically reciprocating mandrel and delivered from the machine in an orderly end-to-end position on a conveyor.

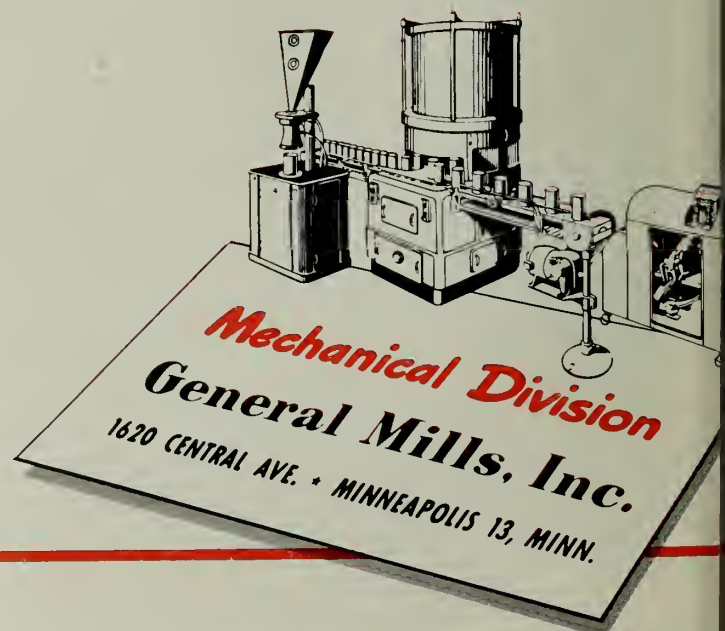
### IT'S BUILT TO LAST

Frame is welded structural steel, panels are stainless steel. High speed or heavily loaded bearings are sealed, self-aligning ball type. Lighter duty bearings are replaceable bronze bushings. Standard roller chain is used. Overall mechanical design is soundly engineered to assure trouble-free continuous operation.

Standard equipment includes 110-220 volt, 60-cycle, single phase, ½ HP motor and a hand-wheel controlled variable speed unit.

The machine's dimensions are as follows:

	WITH HOPPER	WITHOUT HOPPER
HEIGHT	57"	49"
LENGTH	44"	28"
WIDTH	26¼"	26¼"



**Mechanical Division**  
**General Mills, Inc.**  
1620 CENTRAL AVE. • MINNEAPOLIS 13, MINN.



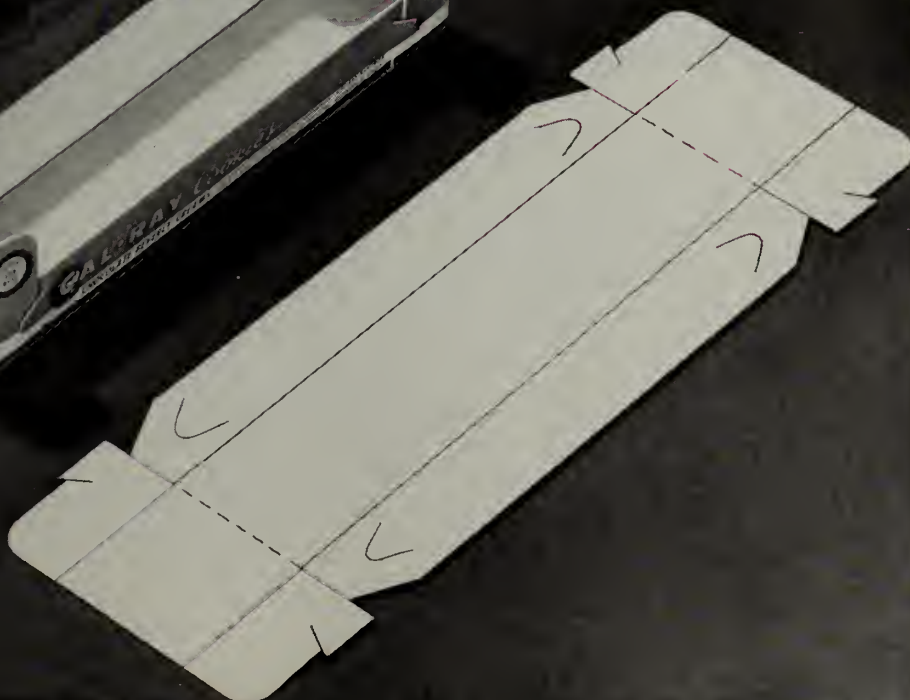
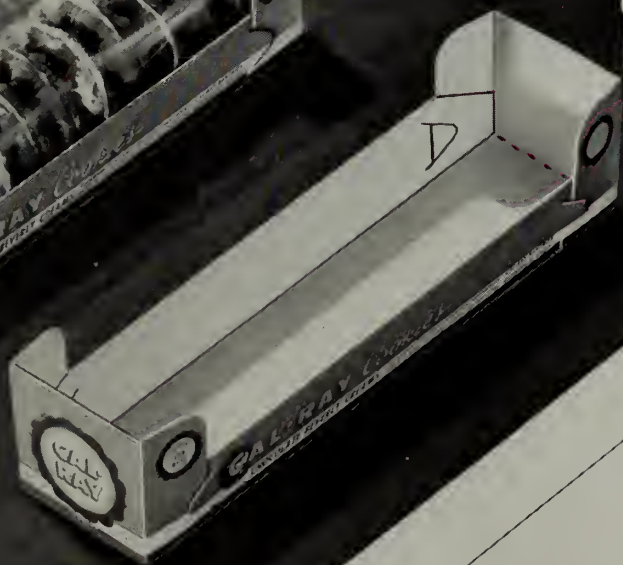
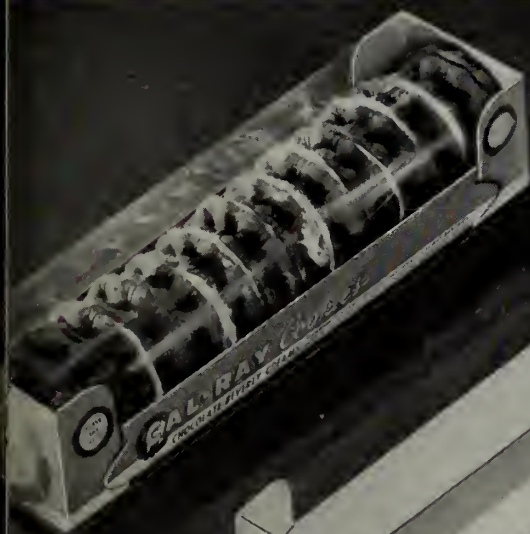
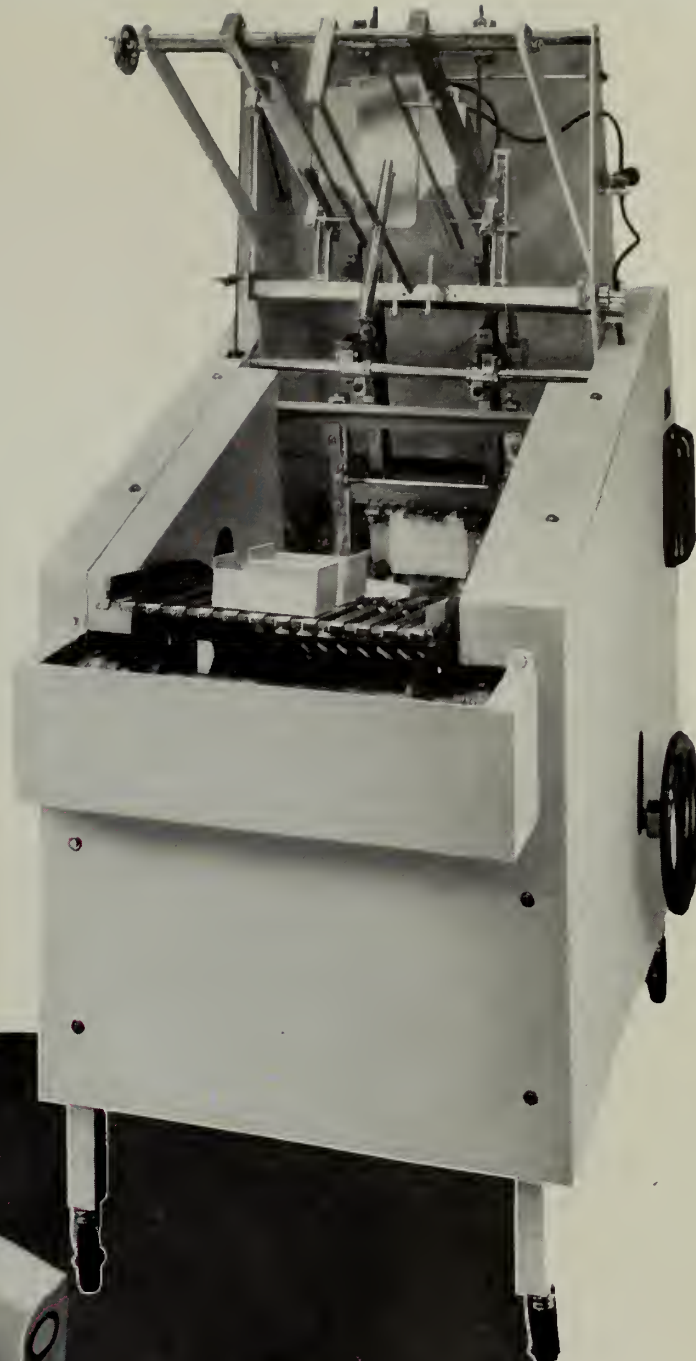
# KLIKLOK

## A-2

### AUTOMATIC BOX FORMER

*Trays are automatically formed, the speeds depending on container size. Maximum speed: 100 a minute. Size is quickly adjustable within range of the machine by the turning of a knob.* ►

*Trays are designed to fit your particular product. See other side for details.* ▼





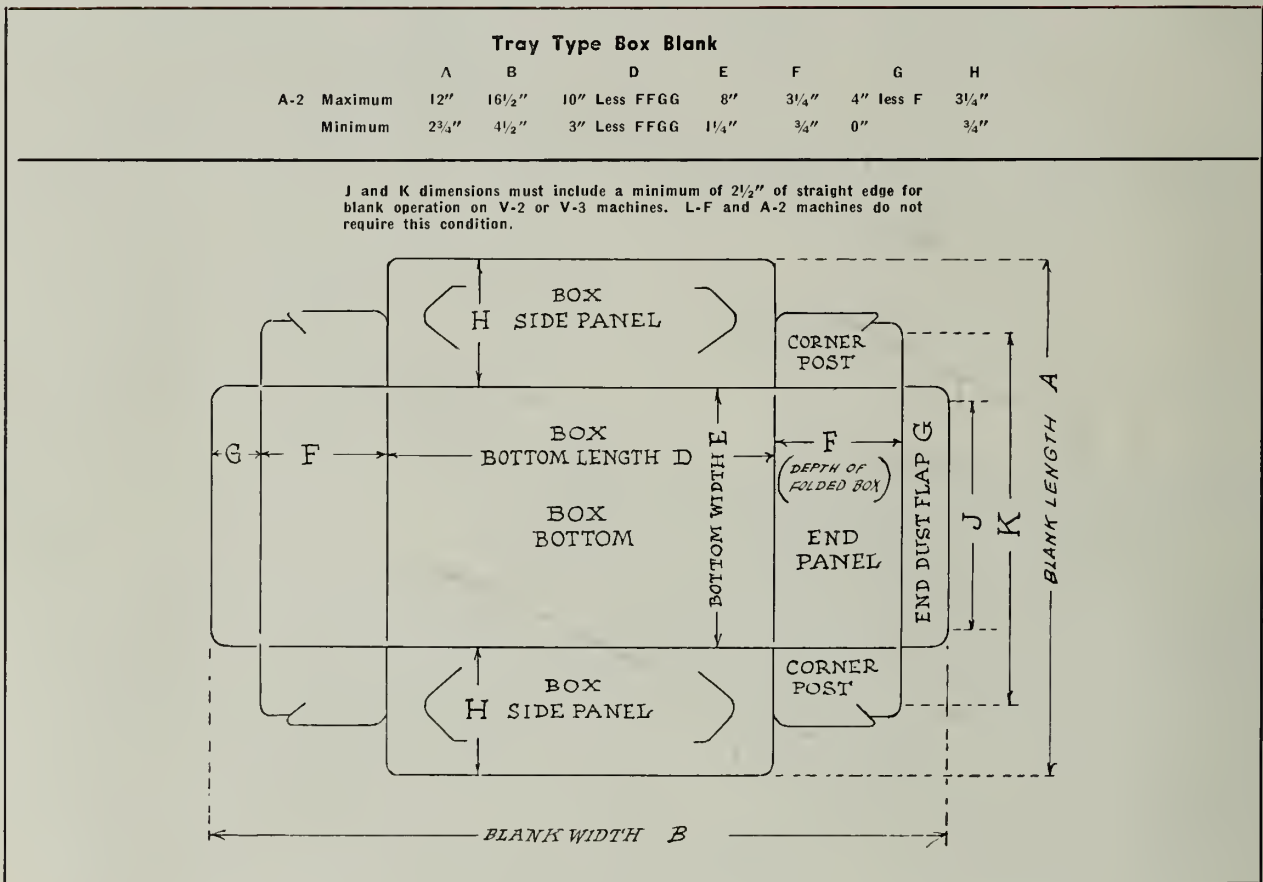
## KLIKLOK Automatic Box Former

can be easily synchronized to your production line, and its speed regulated by the turn of a knob, speed depending on tray size; minimum: 20 a minute; maximum: 100 a minute. A compact unit, KLIKLOK Box Former requires

very little floor space. Size is: width: 36"; length: 48"; over-all height: 60"; height to loading magazine: 40"; motor requirements:  $\frac{3}{4}$ -horsepower; 220 or 440 volts AC. Other power specifications on request.

## KLIKLOK BOX FOLDING MACHINES CAPACITY SPECIFICATIONS

## MODEL A-2



## U S E S

### Baked goods, including

Cookies  
Cakes  
Doughnuts  
Pies  
Buns, crackers, pretzels, rolls

### Fresh fruit

### Fresh vegetables

### Frozen foods

### Packaged pre-cut meat

### Dried fruits

### Fish

### Candies

### Chewing gum

### Drug products, including

Cosmetics  
Manicure Sets  
Shoe polishing sets  
Toothbrushes

### Leather goods, including

Belts  
Wallets  
Billfolds  
Suspenders  
Memo books  
Watch straps

### Clothing items, such as

Neckties  
Handkerchiefs

### Socks

### Stockings

### Girdles

### Gloves

### Underwear

### Slippers

### Tennis sneakers

### Bathing shoes

### Automotive parts, accessories

### Airplane parts

### Hardware items

### Smokers' supplies, such as

Tobacco  
Pipes  
Lighters  
Cigarettes

### Stationery items, such as

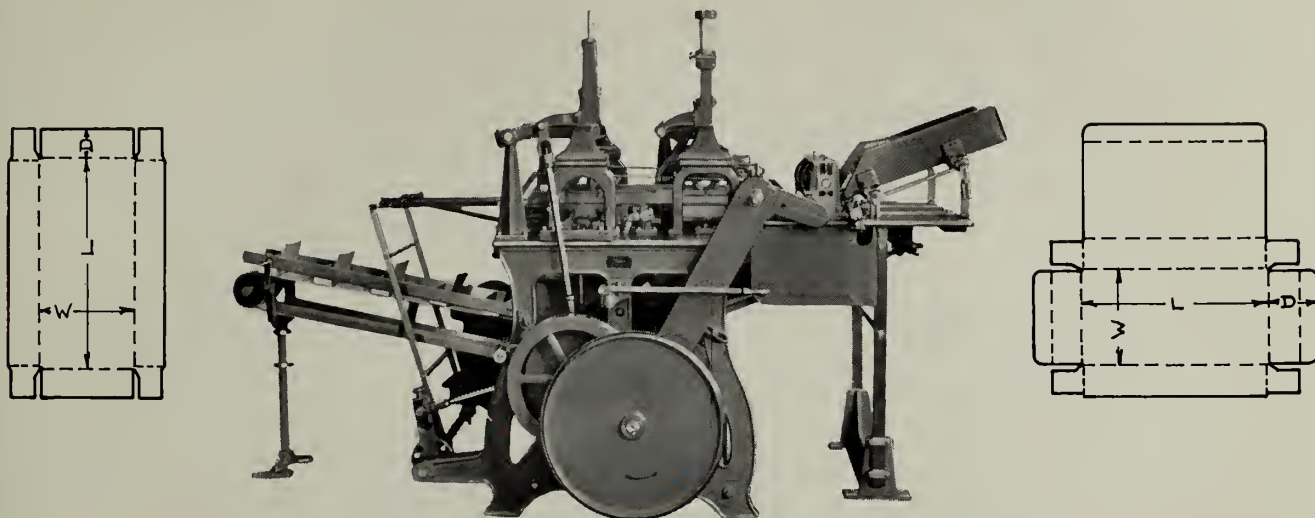
Pencils  
Small items for the desk  
Pen and pencil sets

### Small items, such as

Tie clasps  
Cuff links  
Costume jewelry  
Button sets  
Spool thread  
Knitting yarn  
Golf or tennis balls  
Fishing flies and tackle  
Playing cards  
Souvenirs

And innumerable other small and medium size articles.

# Fully Automatic ROTARY FEED BRIGHTWOOD BOX MACHINE



The BRIGHTWOOD Box Machine is a flexible machine for gluing and forming folding boxes from flat pre-cut and creased (or scored) blanks. In addition to one-piece hinge-cover boxes, two-piece boxes with full telescope covers or shallow lids, trays, etc., it can be equipped to produce solid bottom cartons glued on two vertical sides, for such items as dessert powders, cake mixes, playing cards, etc. The BRIGHTWOOD can also be equipped for making tapered cartons, such as used for ice cream, or tapered tomato trays, etc.

The Rotary Feed BRIGHTWOOD Machine is a fully automatic model designed especially for continuous operation. It is widely adjustable, but it is most valuable where size changes are infrequent. Where there is steady, uninterrupted operation on one size of box, the fully automatic Rotary Feed is particularly advantageous in giving increased daily production. On the Rotary Feed machine the blanks can be replenished at any time while the machine is in operation, thus avoiding even momentary interruptions for renewal of the blank supply.

It requires only part time of one attendant to replenish the blank magazine, thus permitting one operator to attend more than one machine.

The Rotary Feed is simple in design and fast in operation, providing continuous feeding of the blanks by combing wheel feed. An advantageous feature of the Rotary Feed BRIGHTWOOD is that only one blank at a time is placed on the gluing platform, thus assuring a perfect gluing job for every box.

The BRIGHTWOOD Machine uses cold water glue. After application of the glue the box is formed and pressure is applied to provide positive adhesion, and the completed box is discharged, ready for use. The BRIGHTWOOD handles prepared flat blanks, either creased or scored, plain or printed, made from bendable or unbendable stock, ranging in thickness from .015 to .075 caliper, at running speeds up to 60 pieces per minute. The Rotary Feed BRIGHTWOOD Machine will handle both single wall and double wall blanks, including blanks having a metal edge (such as for wax paper roll cartons).

Changeover time requires approximately 30 minutes for a minor size change (such as changing from box to corresponding full telescope cover), up to about 90 minutes for a major change.

In referring to the box dimension specifications shown hereunder and on the reverse side, it should be borne in mind that all maximum limits or all minimum limits cannot be incorporated in the same box. The width plus one depth limitation of 12 inches can be increased to 14 inches by the addition of standard equipment for that purpose.

We also manufacture a COLLAPSING UNIT which can be attached to the BRIGHTWOOD. Our UNIVERSAL COLLAPSER is used for "knocking down" or folding the formed boxes as they emerge from the BRIGHTWOOD Machine, thus facilitating storage or shipment of boxes.

## SPECIFICATIONS

(SEE ALSO REVERSE SIDE)

Machine Size	Floor Space	Weight (lbs.)	Motor Size HP	Running Speed Per Min.	Depth		Width		Length		One width plus one depth plus one depth can not exceed	Largest flat blank that can be handled
					Min.	Max.	Min.	Max.	Min.	Max.		
4"	72"x148"	4500	1½	55-60	½"	2¾"	1"	9½"	2"	15½"	12"	21½"x24"
6"	72"x148"	4600	1½	50-60	¾"	4¾"	1"	9½"	2"	15½"	12"	21½"x24"

## UNITED STATES AUTOMATIC BOX MACHINERY CO., INC.

(Divisions: National Packaging Machinery Co.—Cartoning Machinery Corp.)

18 ARBORETUM ROAD

ROSLINDALE 31, BOSTON, MASS.

Branch Offices:

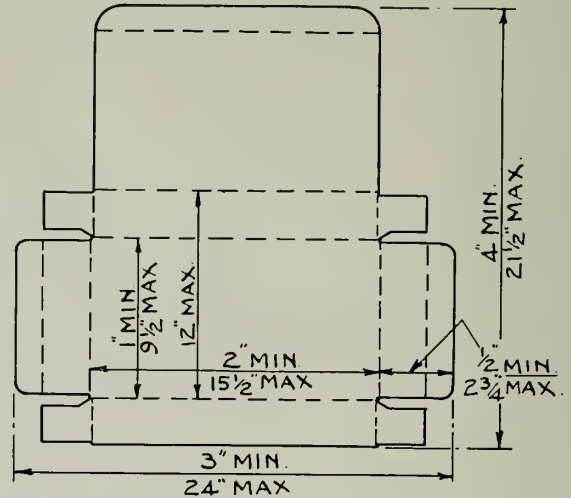
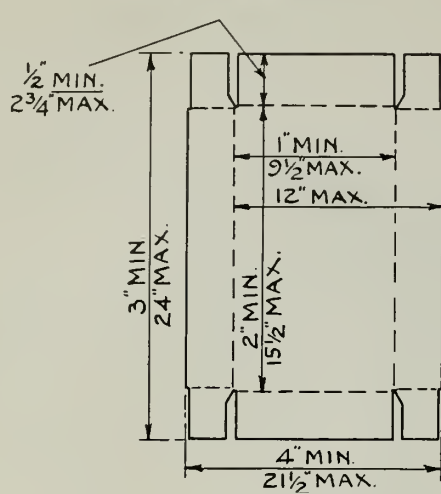
NEW YORK

CLEVELAND

CHICAGO

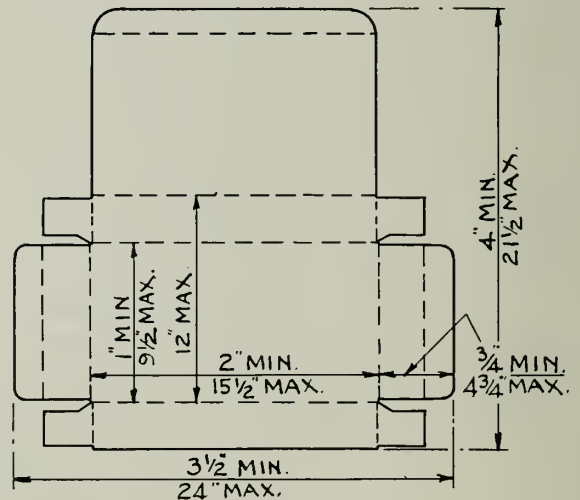
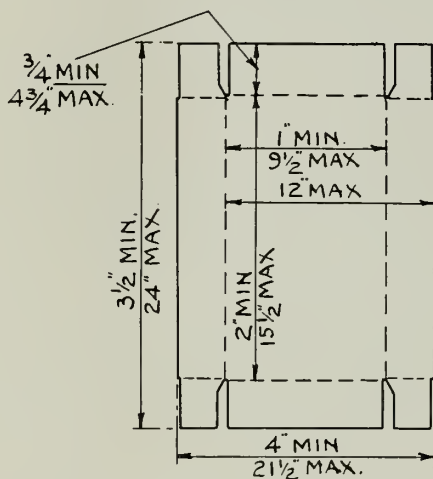
LOS ANGELES (KRUGH EQUIPMENT & SUPPLY CO.)

## BRIGHTWOOD BOX and BLANK SIZE RANGE



### 4" ROTARY FEED BRIGHTWOOD MACHINE, END SHEDDER TYPE

This machine is ideal for gluing and setting up large volume runs of small or shallow boxes, specifically those with a depth of 2 3/4" or less. It is most serviceable for plants requiring a minimum of box size changes, for items such as chewing gum, cigarettes, candy, etc.



### 6" ROTARY FEED BRIGHTWOOD MACHINE, END SHEDDER TYPE

This model is similar to the 4" Rotary Feed except that it has a greater size range, specifically as to depth. Although this machine is primarily built for large volume runs, it is also used for setting up numerous different sizes because of its wide size range and easy adjustability, and can be used for producing boxes for cheese, candy display, hardware, tapered ice cream pails, etc.

This circular has been printed better to acquaint you with BRIGHTWOOD Box Machines and to show in a general way their standard size limitations. If you have a box problem which is not clarified herein do not hesitate to ask us for further information in reference to special and extreme box size limits.



ducive to superior printed designs. In the case of the Brightwood blank, this handicap is overcome because the blank is glued and not self-locked, as in the case of the Klik Lok blank.

In conclusion, it must be noted that box forming machines are only adaptable to large volume packaging.

#### K. Kaleidoscopic Packaging

An attractive feature of the folding box that has not been mentioned is its secondary utility or kaleidoscopic packaging. Advertising men are not altogether joking when they say they make their living with box tops. Paperboard cutouts of all kinds have long been recognized as profitable sales builders. They may be built right into the box while it is being manufactured without extra cost. Although kaleidoscopic packaging, creating a demand for the package as well as for the contents, is a recognized builder of sales volume it should not be considered a substitute for fundamental product quality and packaging soundness. It should be noted also that possible extra costs to the marketer are involved, as brought out by the following from P. H. Nystrom's "Marketing Handbook":

"Dealers may be prejudiced against this type of packaging because it may not increase their sales of the type of product involved to any worthwhile extent and at the same time it may require an increase in the time required to complete a trans-

THE UNIVERSITY OF CHICAGO  
DIVISION OF THE PHYSICAL SCIENCES  
DEPARTMENT OF CHEMISTRY  
CHICAGO, ILL. 60637  
U.S.A.

RESEARCH REPORT

1. The following report describes the results of a study of the properties of a new material, which has been found to have a number of interesting characteristics. The material is a polymer of a certain type, and its properties are being investigated in order to determine its potential uses in various fields of science and industry. The study has been carried out by a group of researchers who are working in the Department of Chemistry at the University of Chicago. The results of the study are being reported here in the form of a research report.

2. The material under investigation is a polymer of a certain type, and its properties are being investigated in order to determine its potential uses in various fields of science and industry. The study has been carried out by a group of researchers who are working in the Department of Chemistry at the University of Chicago. The results of the study are being reported here in the form of a research report.

action involving the sale of the item and an increase in total inventory."

#### L. Dual Use

Another form of kaleidoscopic packaging to which the folding carton is better adaptable is the dual use package. An interesting example of a dual use package is enclosed on the following page. This Reverse Tuck type of folding carton is the most economical folding carton to produce because it can be laid out on a sheet of boxboard in a complete nest without wasting paperboard. This carton is used by the Polaroid Corporation, Cambridge, Massachusetts and produced by the Container Corporation of America, Medford, Massachusetts. In its original form it is a container for the film used in the famous Polaroid Finished Picture-in-a-minute camera. After the film has been removed from the carton and loaded into the camera, the carton is flattened on the scores (creases) down the side panels, the dust flaps on top and bottom are removed, and the tucks folded back and joined at the rear of the carton, forming a neat pocket or belt holder for the slightly moist, developed pictures. Not only does the newly formed holder protect the moist finish of the picture, but it serves to keep the print rigid until it is completely dry, thus preventing its curling.

This ideal example of dual use packaging takes due caution of the pitfalls possible to this form of packaging,







Example of Dual Use Packaging



**POLAROID**  
*Land*  
**FILM**

USE BEFORE

TYPE

F 755

SEE INSTRUCTIONS INSIDE  
8 PICTURES 3 1/4 x 4 1/4

CAMBRIDGE 3V INSTRUCTIONS  
POLAROID AND © 1968 POLAROID CORP.

**POLAROID**  
*Land*  
**FILM**

FINISHED PICTURES  
IN A MINUTE

Type 40

SAVE THIS CARTON

MANUFACTURED BY  
POLAROID CORPORATION







as brought out by Professor P. H. Nystrom's "Marketing Handbook", page 456:

"The re-use feature of the package should not interfere with its function as a carrier of its contents. In providing the secondary use, the package should not be so expensive, or appear so expensive, as to lead the prospective purchaser to believe that undue cost has been added to the product. Otherwise sales may be obstructed."

#### M. Odd and Unusual Shapes

Another particular feature of the folding paper box is that it may be formed in odd and unusual shapes. From the sales promotion man's point of view, however, odd and unusual shapes should be adopted only after careful study of the product and the nature of its market, for unusual shapes may meet with sales resistance mainly because of the departure from the traditional, or because of difficulty in handling and using. On the other hand, their novelty may give the unusually shaped folding box considerable sales appeal. Normally, the value of the novelty feature of the shape should be great enough to offset any weaknesses as regards higher costs of manufacturing and packing. Regardless of the marketing limitations cited in this paragraph and in previous features, the fact still remains that the folding box possesses innumerable integral qualities.

## ORIGINAL ARTICLES

THE EFFECT OF THE  
VITAMIN C DEFICIENCY  
ON THE  
HEALTH OF THE  
HUMAN BEING

### REPORT OF THE AMERICAN MEDICAL ASSOCIATION

THE AMERICAN MEDICAL ASSOCIATION HAS THE HONOR TO ANNOUNCE THAT IT HAS

APPOINTED A COMMITTEE TO INVESTIGATE THE EFFECT OF THE VITAMIN C DEFICIENCY ON THE HEALTH OF THE HUMAN BEING.

THE COMMITTEE HAS THE HONOR TO ANNOUNCE THAT IT HAS COMPLETED ITS INVESTIGATION AND HAS PREPARED A REPORT WHICH IS HEREBY SUBMITTED TO THE ASSOCIATION.

THE REPORT OF THE COMMITTEE IS HEREBY PUBLISHED IN THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

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## N. Manufacturing Economy

The outstanding feature of the folding paper box that will be exploited a bit further in later discussion lies in its economy. The mass production of folding cartons requires no individual hand operations. Manufacturers of consumer goods are able to reap the benefits of manufacturing economies in a package which fulfills their most exacting requirements at a low unit cost.

The economy of the folding box is further enhanced by the fact that it is shipped from the boxmaker to the user in a flat or knocked down position. No space is wasted transporting air, and the boxes occupy a negligible amount of room in the user's warehouse.





## II. PICTORIAL REVIEW OF FOLDING CARTONS

### A. Introduction

There are many basic styles of folding boxes available on order from the folding box manufacturer, and new ones are being developed constantly. It would, in fact, be quite easy to list a hundred or more basic styles of folding boxes, display containers and dispensers. Some of these styles were developed several years back, and have been in regular and effective use as sales builders ever since. Others were developed at later dates, and still others have been but newly introduced to the packaging world. To show, or even list, all the basic styles available to the manufacturer and distributor would be impractical in a report of this size. However, it is hoped that through certain principal styles selected for illustration and description, the wide variety of choices possible may suggest themselves. The particular styles shown have been chosen on the basis of popular usage and their ready adaptability to a wide range of products.

The illustrations shown on pages 19 to 25 were furnished by the Modern Packaging Corporation, New York City and the Old Dominion Paper Box Company of Charlotte, North Carolina.



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## B. Folding Carton Construction

The construction of the most popular and basic folding carton styles are shown below in diagram form:

Fig. 1 Reverse Tuck

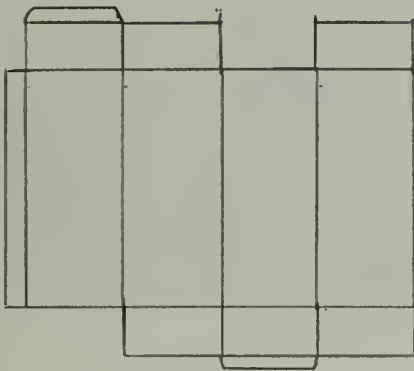


Fig. 2 Straight Tuck

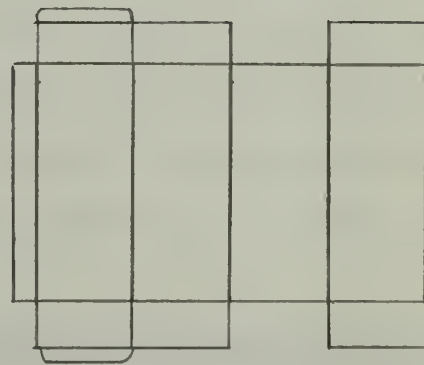


Fig. 3 Full Seal End

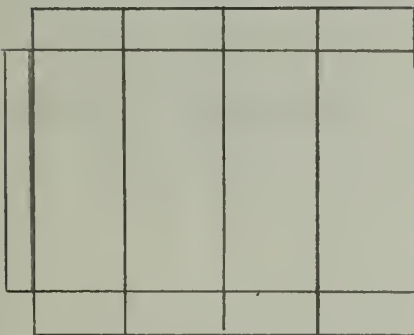


Fig. 4 Lock End

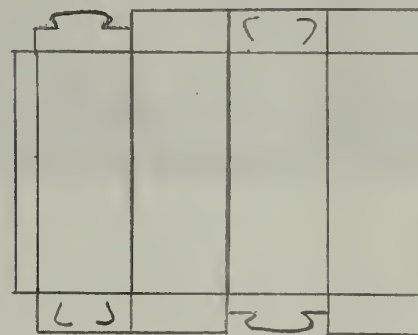


Fig. 5 Brightwood

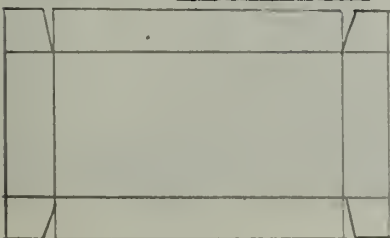
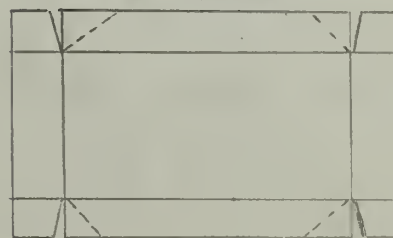


Fig. 6 Biers



THE UNIVERSITY OF CHICAGO

THE UNIVERSITY OF CHICAGO  
CHICAGO, ILLINOIS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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### C. Folding Carton Parade



Reverse Tuck. The ace of folding cartons. A very popular style, owing to economy of cost and ease of setting up, either manually or by machine. The box in photo to the right has the added locking feature of the Arthur lock. The box below is the conventional reverse tuck type folding carton.

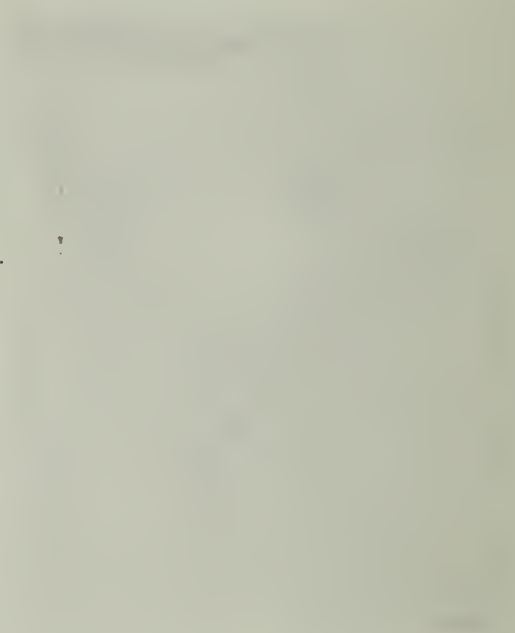
Reverse Tuck carton paraffin coated for grease resistance.



A Straight Tuck carton with cellophane "window" and special flap forming false bottom.

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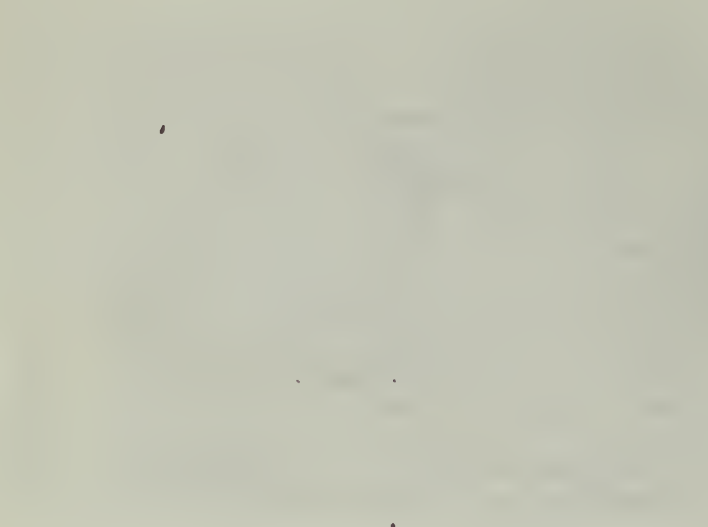
Double wall web construction box with turnover ends; two piece telescope. Special interior platform die-cut to hold product.



Brightwood. Two piece telescope box delivered flat to user where it is formed as needed by machine that glues corners.

Two piece collapsible telescope box. Outfold cover and bottom.





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Combination display and shipping container. Box enhances multiple-unit sales.

Dramatic window treatment makes this package popular in self-service drug stores, where there is no sales clerk to call attention to a sensational new method of hair waving.



The popular cello-  
overwrapped tomato  
and apple tray.



The widely-used cellophane-window bakery carton. Carton is laminated with special greaseproof paper.



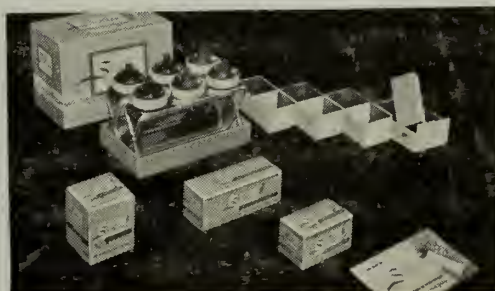






The versatility of the folding box has displayed itself once more in its recent invasion of the cigar industry.

The component parts of this package are nested in a quickly assembled display tray, which slips easily into the carton. The kit has complete protection inside and out. The package sets up into an eye-catching counter display.



These Shellie Nurser Kit components...  
... fit snugly into this eye-catching display box!



Cellophane over-wrapped fruit display container.



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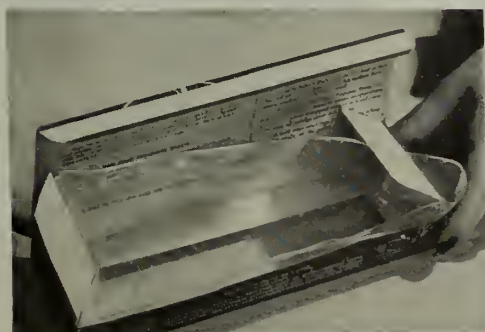
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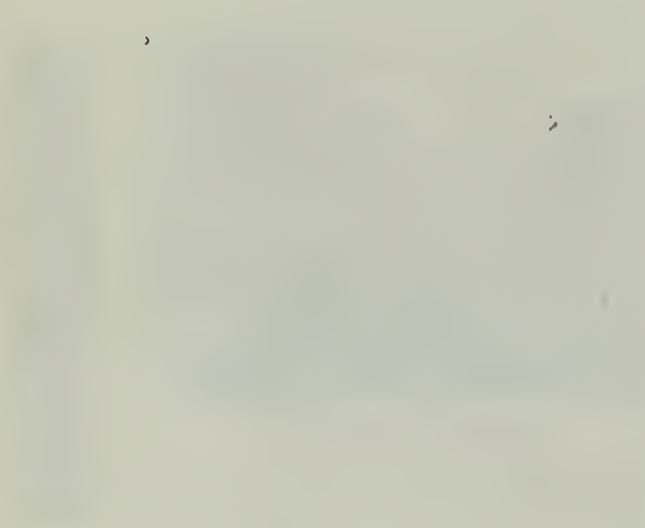
Folding carton with tuck top and special Gatke lock bottom.

Full Seal End carton for high-speed automatic handling.



Cracker style carton, adapted for frozen foods, has window and cellophane liner, forming three ply package.

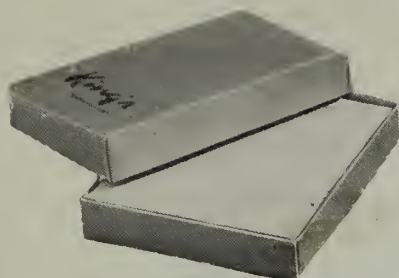
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OF GREAT BRITAIN AND IRELAND  
VOLUME 100 PART 1 2000



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VOLUME 100 PART 1 2000



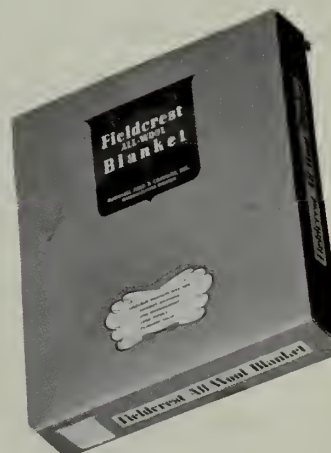


Stationery Boxes. Smart and attractive, these superior packages lend richness and prestige to the product.

Folding cartons of modified straight tuck structure. Bottom flaps form Quad lock. Top flaps die cut to form locking tongues around top of bottle.



Blanket manufacturers find the folding box excellent for their product.



THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF CHEMISTRY  
1155 EAST 58TH STREET  
CHICAGO, ILL. 60637

TO THE EDITOR:  
I am writing to you to inform you  
that I have received your letter  
of the 10th of this month.  
I am sorry that I cannot  
reply to you more quickly.  
I am very busy at the moment.  
I will try to get back to you  
as soon as possible.

Very truly,  
Yours,  
[Signature]

Enclosed are two copies of  
the report of the committee  
on the subject of the  
proposed changes in the  
curriculum of the  
Department of Chemistry.  
I hope that you will find  
this report of interest.  
I am sure that you will  
be able to make a  
decision on the matter  
very soon.



### III. THE SET UP BOX

#### A. What is a Set Up Box?

"A set up paper box is perhaps best described as a rigid, non-collapsible container produced in three dimensional form and delivered to the consumer ready for use. It is manufactured chiefly from paper and paperboard, usually, but not necessarily, wrapped with paper. While most set up boxes in use today are either oblong or cylindrical in shape, the architectural variations are limitless as the designer's ingenuity and the manufacturer's productive ability will permit. In its simplest form, it is a square cornered, two piece container, properly reinforced. However, a set up box may comprise several members, each covered with its own distinctive wrapper, lined with rayon or velvet. In addition to the conventional shapes, the set up box may be produced in many interesting and novel shapes.

(1)

#### B. Set Up Box Wraps

Printing, or decorative effect, is an integral part of the folding box. The set up box, on the other hand, is decorated by a separate wrapper. This affords the set up box a wide latitude in appearance. The set up box may appear in a plain, grayish chipboard, or it may display its product in a setting of the most luxurious materials.

There is available today a variety of covering papers with infinite designs, colors, decorative effects and finishes. Just a few of the many types and grades of wraps

(1) Tedeschi, E. T., Packaging Catalog, 1945., New York, N.Y., Breskin & Charlton Publishing Company, p 149.

# THE HISTORY OF

## THE UNITED STATES OF AMERICA

The history of the United States of America is a story of growth and development. It begins with the first settlers who came to the continent in search of a new home. They found a land of vast resources and opportunities, but also one of many challenges. The early years were marked by conflict and struggle, as the settlers fought to establish their communities and defend their rights. Over time, the United States grew from a small colony into a powerful nation, with a rich and diverse culture. The story of the United States is a testament to the power of the human spirit and the ability of a people to overcome adversity and build a better future.

## THE FOUNDING OF THE NATION

The founding of the United States is a story of vision and leadership. It was a time when a group of men came together to create a new nation, one that would be based on the principles of liberty and justice for all. They faced many challenges, but they were determined to succeed. They wrote the Constitution, which established the framework for the new government. They fought the Revolutionary War, which secured the nation's independence. The founding of the United States is a story of courage and sacrifice, and it is a story that continues to inspire us today.

can be found in the appendix. Wrappers are available today that closely simulate valuable metals, expensive fabrics, leather and enamel finishes which allow the package designer free play for his creative ability. Any decoration that can be applied to paper may be used on the wrap for set up boxes. The possibilities of covering set up boxes are practically limitless. The appearance of the set up box can take the simplest to the most luxurious form.

Some of the fancy wrapping paper manufacturers are producing excellent protective papers with "greaseproof" and "moisture-vaporproof" qualities. Some of which may be combined with decorative printed or embossed effects.

### C. Eye Appeal

The set up box has a decided advantage over most containers from the standpoint of eye appeal which can be translated into sales appeal. Some boxes have been known to be over-dressed thus tending to destroy the value of eye appeal. On the other hand, a properly decorated, well-designed set up carton, not only possesses the utility factor of protecting the contents, but it has an aesthetic value in creating an atmosphere of worth to the product.

A local manufacturer, who prefers to remain anonymous, cites the following extreme example of quality imparted by a set up box. A New York distributor purchases an item





from him for \$1.75 and packages the product in a well decorated set up box at a cost of 35 cents. The distributor then retails the item for \$12.75 Of course, this is not an ethical business practice, nor is it one that will succeed in the long run. Although an extreme example, it does point out that an effective package can be translated into increased profits.

Another important factor in the favor of the set up box is its appearance of permanence. Its appearance of permanence and beauty invariably ensures a prominent place in showcases, window displays and on the counter at the point of sale.

#### D. Protective Qualities

The manufacturer who requires a protective carrier for fragile items, a retail dispenser for fragile items, a semi-permanent container for medical supplies or small machine parts, a simple mailer or a shipper for highly sensitive explosives, looks to the set up box as the most adaptable.

The advantageous feature of rigidity in the construction of the set up box is ensured by the use of a strong rigid paperboard. The caliper range in inches of set up boxboard runs from .025 to .065 (1) Should greater rigid-

(1) Whiting, Grafton., Packaging Catalog, 1945, New York, N.Y. Breskin & Charlton Publishing Company, p 131.





ity be necessary, boxboard can be laminated to meet almost any specification. The grades and furnish of the paperboard used in the manufacture of set up boxes can be found in Table III.

The rigidity inherent in the construction of the set up box coupled with the non-bending qualities of set up boxboard provides valuable stacking strength.

Set up boxes possess other unique features which have combined to make it one of the most popular types of containers.

#### E. Low Unit Cost

Maximum eye appeal and protection are undoubtedly the most important features of the set up box. However, low unit cost is becoming an increasing factor to many users.

(1) The set up box is used extensively on retail counters in the stores where mass produced, low priced trinkets are sold, as well as in luxury shops where quality and distinction are paramount. Low cost paperboard, economically produced wrapping materials, and automatic wrapping machinery combine to produce a relatively low unit cost.

#### F. Limitations

Despite the economy in the unit cost of the set up box, the shipment of empty boxes and the waste of valu-

(1) Tedeschi, E. op. cit. p 149.

1871. The first of these was the "Theatricals" of the  
Theatricals of the Theatre, which was a very  
successful and popular play.

The second was the "Theatricals" of the Theatre,  
which was a very successful and popular play.

The third was the "Theatricals" of the Theatre,  
which was a very successful and popular play.

The fourth was the "Theatricals" of the Theatre,  
which was a very successful and popular play.

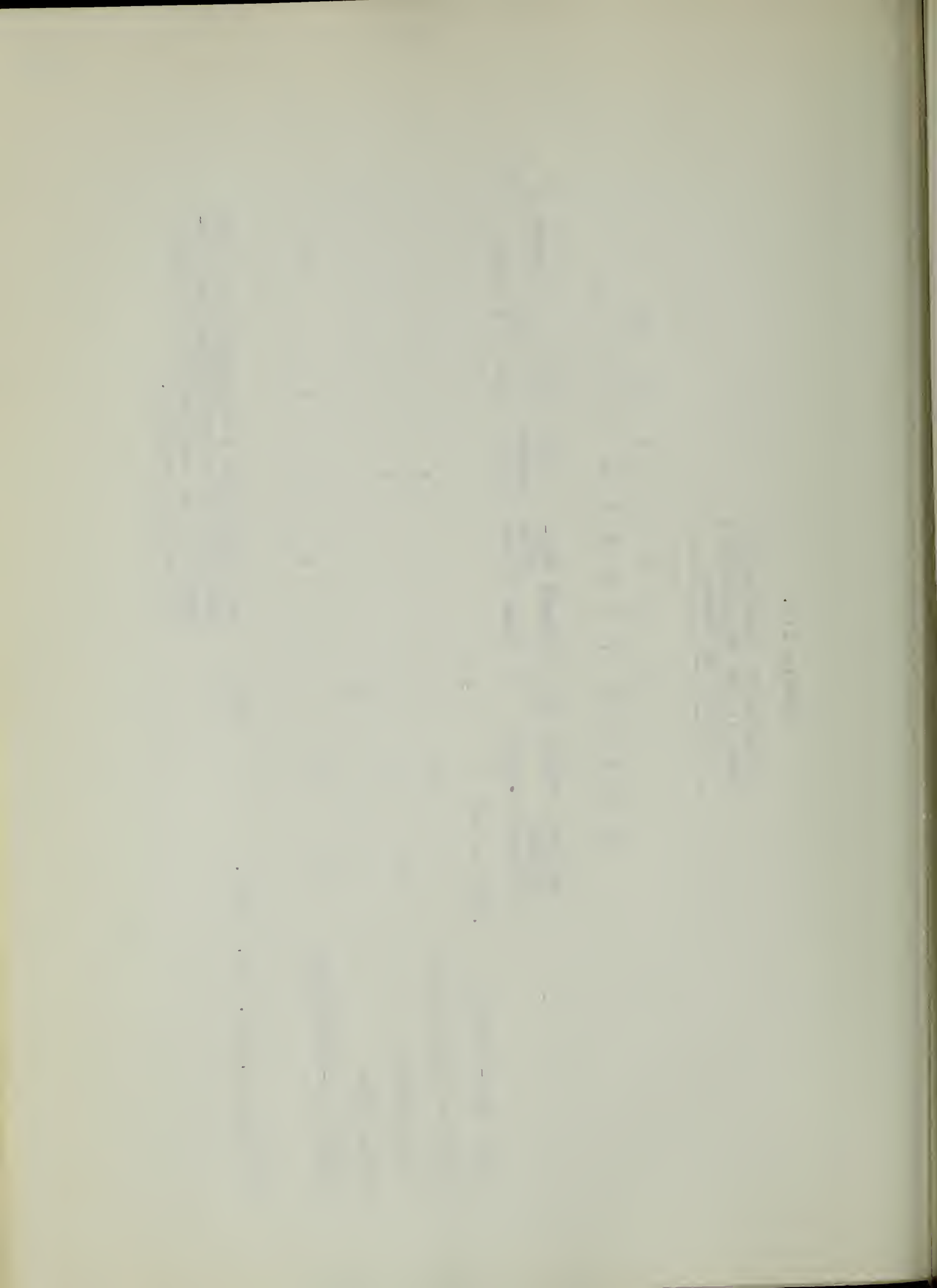
The fifth was the "Theatricals" of the Theatre,  
which was a very successful and popular play.

The sixth was the "Theatricals" of the Theatre,  
which was a very successful and popular play.

GRADES OF PAPERBOARD  
Used in the Manufacture  
Of Set Up Boxes

Whiting, G., op. cit. p 131.

Note: The proportion and selection of raw materials in a furnish may vary depending upon availability of supply and quality required.





able storage space are economic disadvantages, since set up boxes arrive in the user's plant in an erect form. For this reason, and also because unit orders are usually small, plants tend to be small and limited in their field of operation. As a result manufacturers are numerous, tend to serve one or few industries, and are usually unaware of the broad scope of the set up box industry as a whole. (1)

The fact that set up boxes are delivered erect has its advantage as well as limitation. No machinery is needed in closing or setting up the set up box. The user does not have to do anything except fill it. In contrast, the folding box requires either a hand setting up operation or the added expense of automatic box forming machines such as the Brightwood, Cico Sealer, Klik Lok, Palmer, General Mills, et al.

(1) Tedeschi, E. T., Modern Packaging Encyclopedia, 1949  
New York, N.Y., Breskin & Charlton Publishing Co., p 290.



#### IV. PICTORIAL REVIEW OF SET UP BOXES

##### A. Introduction

The illustrations which follow demonstrate the versatility of this type of package as a container of beauty, structural strength and convenience for products as unrelated as cosmetics, hardware, textiles, etc.

##### B. Construction of Set Up Boxes

The set up paper box in its simplest form consists usually of two pieces--top and bottom--square or rectangular in shape, with corners "stayed" by means of reinforcing paper affixed by adhesives. The variations are infinite in number, but no matter what the resulting form, there are six steps in the basic construction. (1)

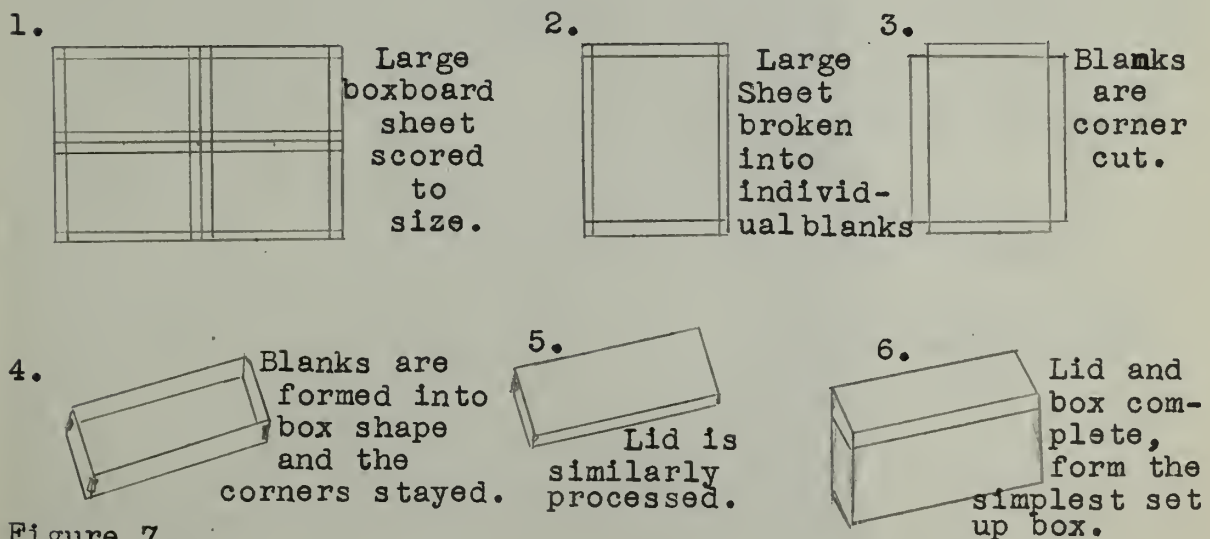


Figure 7

(1) National Paper Box Manufacturers Association.

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### C. Common Variations of the Basic Type

Some of the possible variations and combinations of the basic set up forms are shown by the diagrams below taken from the National Paper Box Manufacturers Association pamphlet entitled "Versatility":

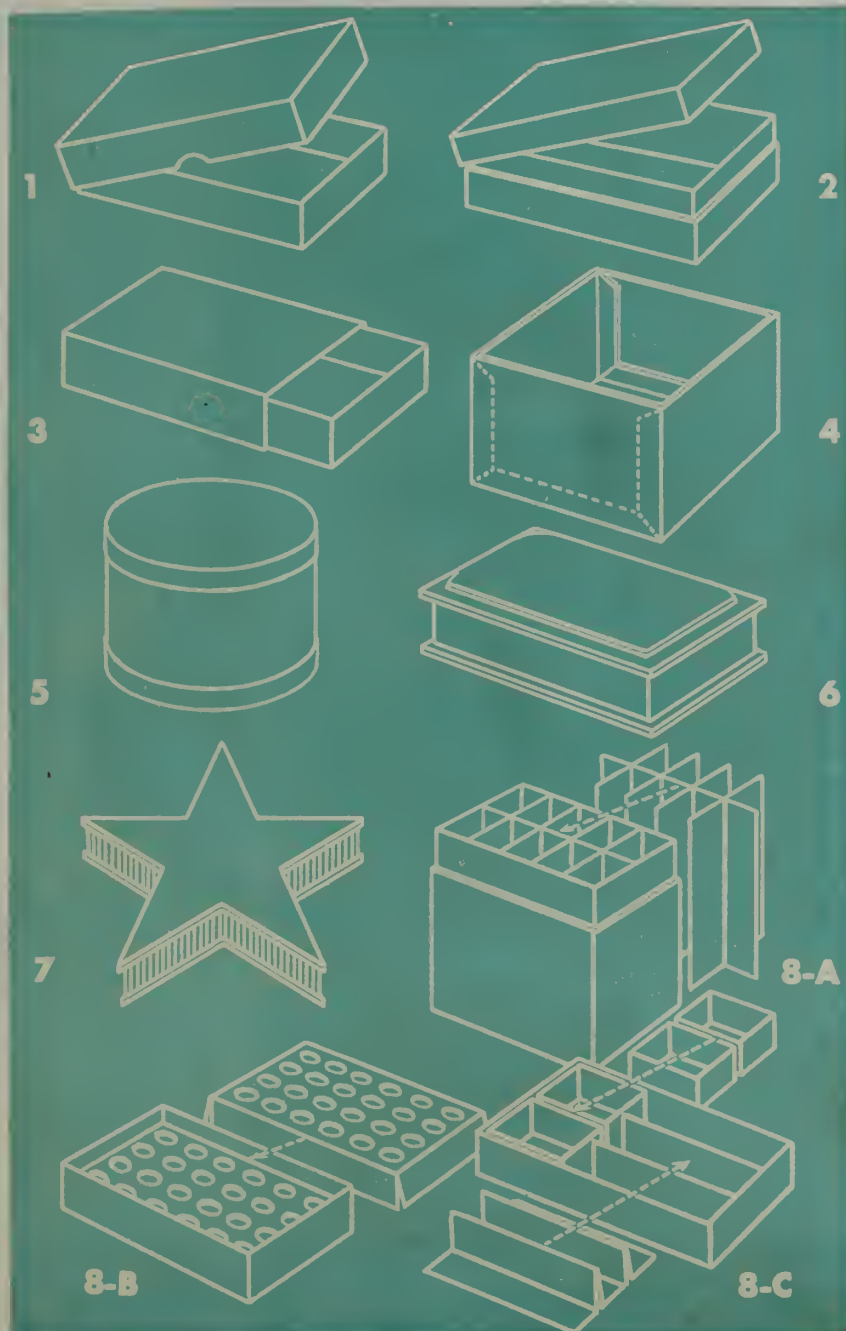


Fig. 8

1. Full Telescope
2. Neck or shoulder style
3. Slide Style
4. Ended Box
5. Round Box
6. Extension Edge with pad top
7. Star Shape
8. Examples of interior partitioning used for additional protection of box contents
  - 8A. Slotted partition
  - 8B. Die-cut platform
  - 8C. Longitudinal and tray dividers.



# THE HISTORY OF THE

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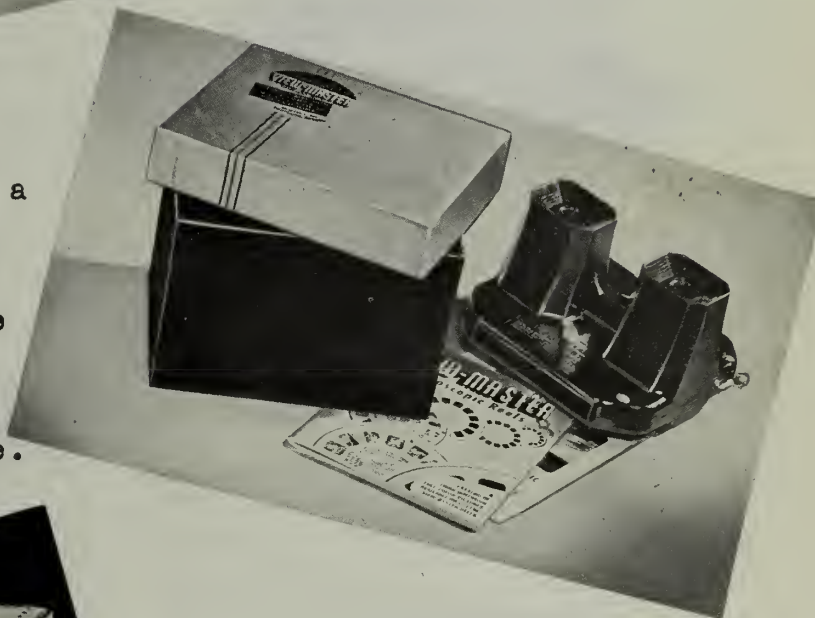
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D. Set Up Box Parade



Octagonal shaped leatherette covered box for men's toilet-tries.

The set up box makes a protective container for an optical device that also serves to store when not in use.

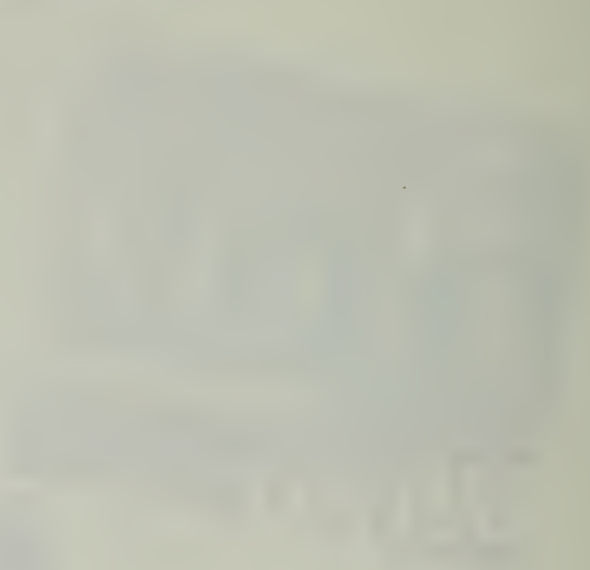


Ornate powder box with hinged lid, padded top, extension base.

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1950



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1950

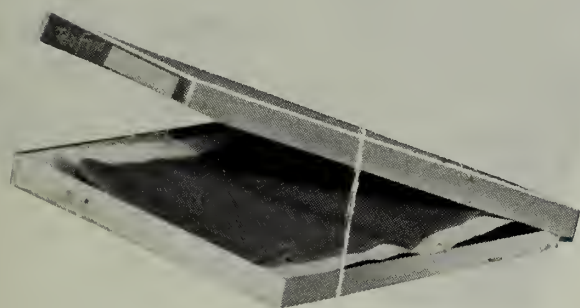
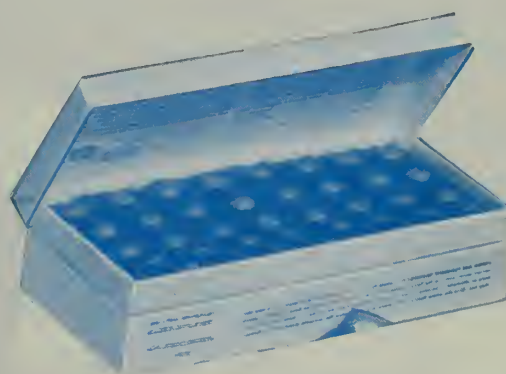


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Set Up Gift Box---The set up box is the ideal container for meeting the many and varied demands of the retail field.

The popular neck or shoulder style candy set up box.



Another retail field favorite, the set up ladies stocking box.

The cellophane "windowed" set up box that has proved a sales boon for men's suspenders, belts and other accessories.



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Confectionery box

with interior trays  
and dividers; exterior  
of metalized gold foil  
paper.



Set Up box with die-cut  
platform for children's  
plastic blocks.

Telescope box with litho-  
graphed overwrap, picturing  
children at play.







Family design applied  
to set up boxes of different sizes and shapes for drug products.

Group of boxes for stationery and office supplies, demonstrating how the sturdy protective function may be supplemented by a variety of external decorative treatments.



The armed forces made use of a telescope box, with thumb-cut for easy opening, containing rifle parts.



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Set up bulk container,  
holding 1 dozen set up  
boxes of hair pins.



Hinged lid box for babies  
shoes; flint-glazed, litho-  
graphed top; base of pebbled  
paper.



Toiletry boxes of uni-  
que construction to  
resemble musical inst-  
ruments; a) sachet pow-  
der box resembling a  
two-manual pipe organ;  
b) bath tablets box with  
a musical decorative motif.



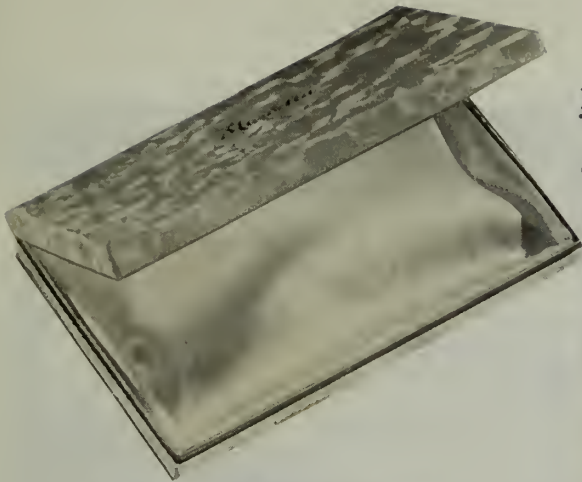
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Neck or shoulder, hinged lid  
set up box. Fabric lined.

Full telescope box, heavy construction, thumb-cut built in partition for dealers' samples of asphalt tile.



Hand made box for artist's pencils. Elaborate construction permits setting up of box for convenient use.

Ended Box. Note reinforcements in end of box which permit repeated handling by dealer; pasted on pictorial label gives individuality to prosaic shoe box.



# THE HISTORY OF THE CITY OF BOSTON

FROM THE FIRST SETTLEMENT  
TO THE PRESENT TIME  
BY  
JOHN H. COLEMAN  
OF THE CITY OF BOSTON

THE HISTORY OF THE  
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JOHN H. COLEMAN  
OF THE CITY OF BOSTON



Slide and shell construction, suitable for long use by ultimate consumer.

Round boxes: Fabricated acetate with rigid drawn top; shoulder style, dome top and extension base.



Group of decorative jewelry boxes, attractively fashioned of fancy paper and fabric on sturdy boxboard structure.

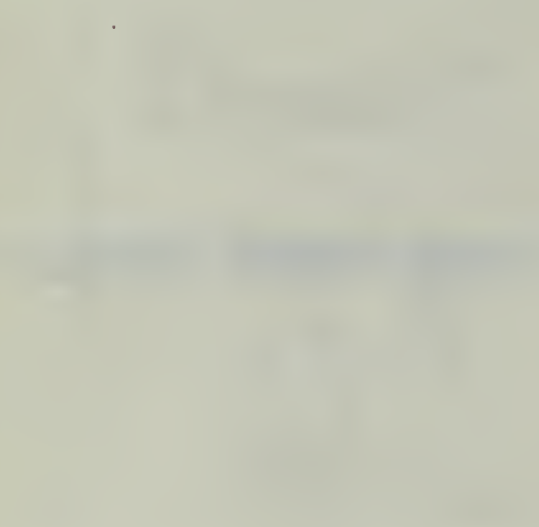




1871



1871



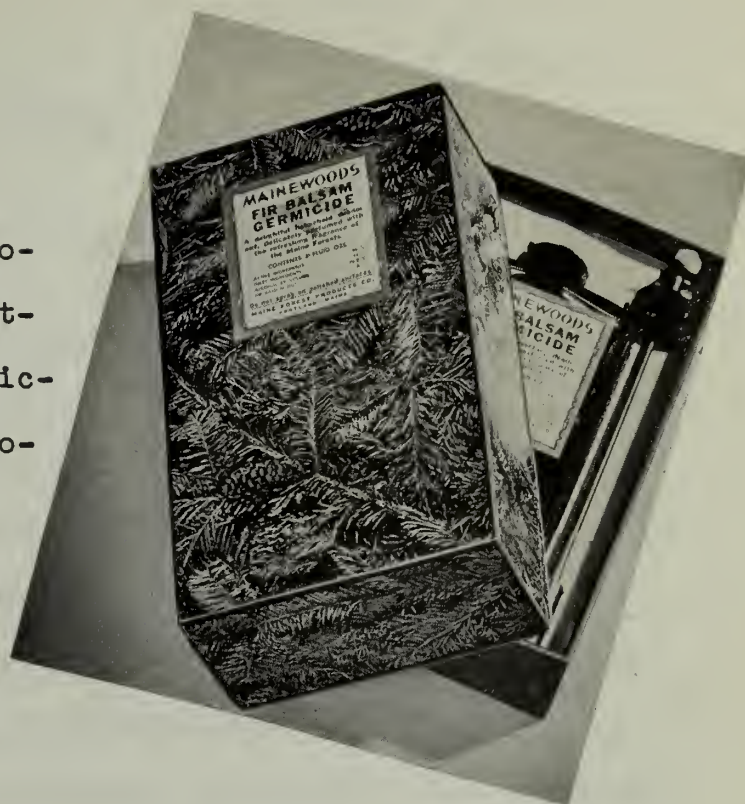
1871

1871





Package for household deodorant with interior platform for bottle and applicator. The wrap of lithographed paper.



Velour-covered box, side opening diagonally; extension base; platform to hold bottle; plastic latch.

Novelty container for cosmetics. Box is tight-wrapped in fancy paper and has three separate removable trays simulating chest of drawers.



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## V. STATISTICAL ANALYSIS OF THE TWO INDUSTRIES

### A. General

The general conclusion that will be gathered from the assembled statistics in this section is that two of the major groups in the paperboard industry, folding cartons and set up boxes, have established their individuality as segments of a leading manufacturing group which has abetted the development of mass production of goods. Some attention will be placed on the Fibre Box industry (corrugated and solid fibre shipping containers), mainly for general comparison, and because it is a vital part of the paperboard box group. For the purposes of the discussion at hand, however, the statistics will serve to show the important positions that set up and folding boxes are taking in the packaging field.

### B. Daily Use of Paper Boxes

To further appreciate the vital part that paperboard containers play in the nation's economy, Table I showing the number of paperboard containers used per day in 1947 is repeated.





Table I. PAPERBOARD CONTAINERS USED PER DAY

<u>Types of Containers</u>	<u>Number Used Per Day in 1947</u>
Folding Cartons. . . . .	223,500,000
Set Up Boxes. . . . .	17,500,000
Fibre Cans and Tubes. . . . .	7,200,000
Corrugated & Solid Fibre Boxes. . .	17,100,000
	<hr/>
Total. . . . .	265,300,000
	<hr/>

Fibre Containers, August, 1948. p 86.

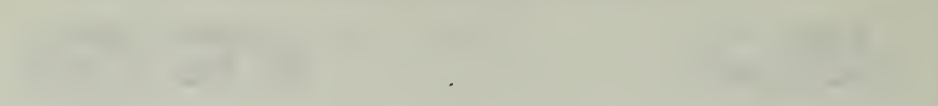
The above statistics could be further augmented by the consumer-unseen millions of boxes involving goods moving entirely in industrial channels, such as the parts of radios, automobiles, refrigerators, etc., moving from parts manufacturers to assembly plants. In addition, many shipping containers transport goods in industrial or whole-sale distribution, where the containers are never seen by the general public. When this is considered, it is not surprising that usage of containers is nearing a rate of two per day per capita.

### C. Distribution of Paperboard Tons

Table IV shows the distribution of paperboard tons from 1937 to 1947 among the leading paperboard groups. It can be seen that containerboard (corrugated and solid fibre) and folding boxboard form increasing segments of annual production.



THE HISTORY OF THE



OF THE  
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LONDON  
FROM  
THE  
FIRST  
SETTLEMENT  
TO  
THE  
PRESENT  
TIME

BY

JOHN STOW, ESQ.  
OF THE  
CITY OF  
LONDON  
AND  
OF THE  
UNIVERSITY OF  
CAMBRIDGE  
IN TWO VOLUMES  
THE FIRST  
CONTAINING  
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THE HISTORY OF THE

CITY OF  
LONDON  
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TIME

Table IV

PAPERBOARD CONSUMPTION  
AMONG MAJOR PAPERBOARD GROUPS  
1937 to 1947

In Thousands of Tons

Groups	1937 M Tons Pctge	1938 M Tons Pctge	1939 M Tons Pctge	1940 M Tons Pctge	1941 M Tons Pctge
Containerboard	2,881 51.9	2,480 50.3	3,000 50.5	3,148 49.8	4,044 51.2
Folding Boxboard	1,238 22.3	1,162 23.5	1,385 23.3	1,413 22.4	1,749 22.2
Set Up Boxboard	570 10.2	519 10.5	586 9.8	613 9.7	732 9.3
Miscellaneous	867 15.6	778 15.7	976 16.4	1,144 18.1	1,366 17.3
Totals	5,556	4,939	5,947	6,318	7,891

Groups	1942 M Tons Pctge	1943 M Tons Pctge	1944 M Tons Pctge	1945 M Tons Pctge	1946 M Tons Pctge	1947 M Tons Pctge
Containerboard	3,607 50.5	3,940 51.7	4,126 52.0	4,100 52.0	4,312 51.0	4,902 53.9
Folding Boxboard	1,561 21.8	1,738 22.8	1,783 22.5	1,868 23.7	2,310 27.3	2,238 24.6
Set Up Boxboard	616 8.6	600 7.8	543 6.9	511 6.5	446 5.3	602 6.6
Miscellaneous	1,363 19.1	1,352 17.7	1,474 18.6	1,404 17.8	1,383 16.4	1,360 14.9
Totals	7,147	7,630	7,926	7,883	8,451	9,102

1937 to 1946: National Paperboard Association, Paperboard Industry Statistics, 1947, Phila., Pa. p 5  
 1947: Bettendorf, H.J., Statistical Summary, Fibre Containers, August, 1948, p 142.

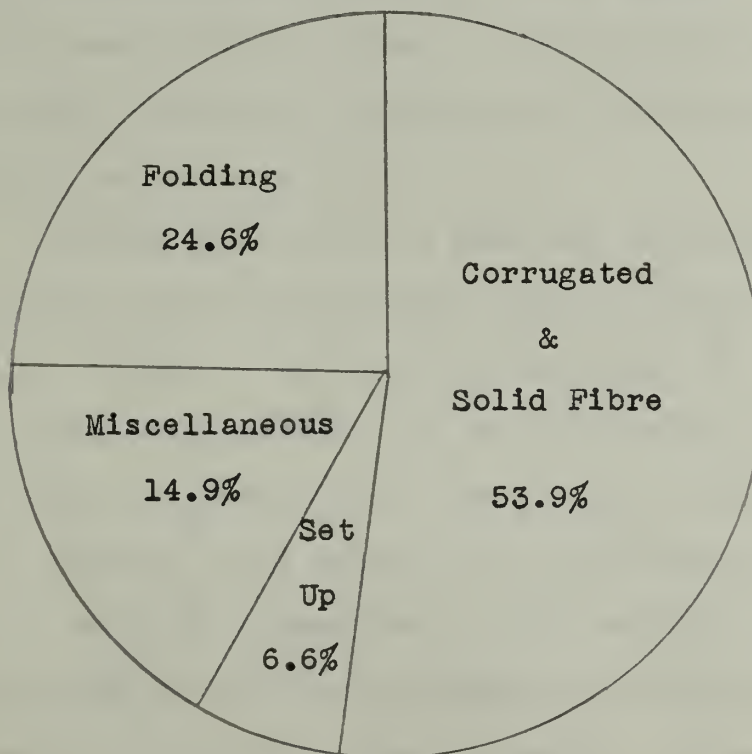


Set up boxboard has been showing a decreasing relationship to total tonnage over the past decade. Set up boxboard production registered the first gain it has shown since 1941, 1947 production increasing 26% over 1946; but, nevertheless production was 18% below that of 1941, although 5% ahead of 1937. However, a compensating if not more profitable revelation will be brought out about this decrease in further statistics in this section.

The 1947 distribution of board tons among the major paperboard groups is illustrated by the pie chart below:

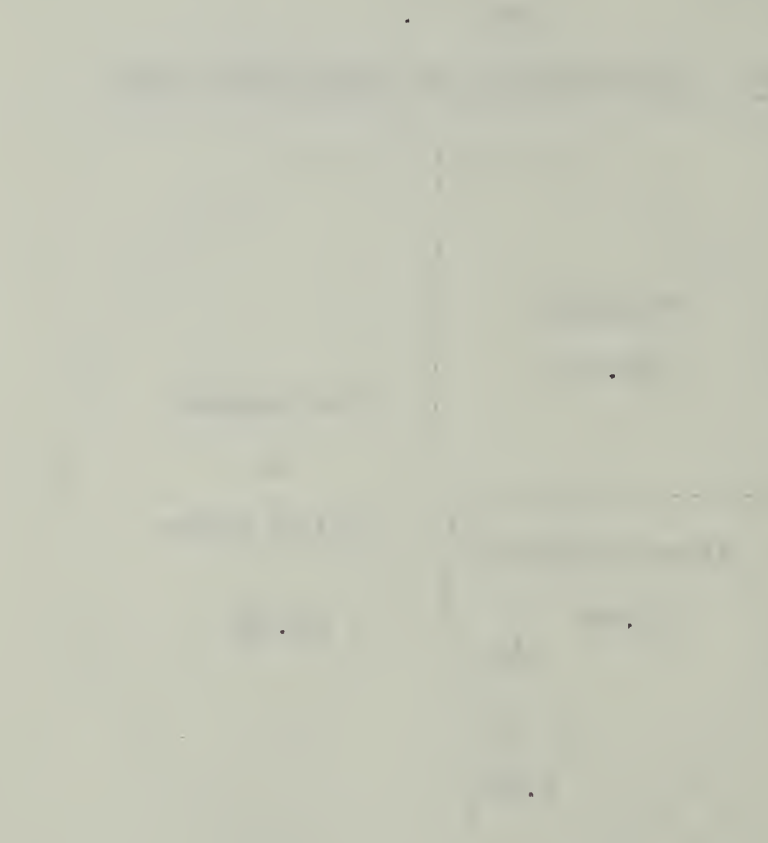
Graph I.

1947 DISTRIBUTION OF PAPERBOARD TONS



See Table IV, p 43.

The first of these is the fact that the  
 system is not a simple one, but a  
 complex one, involving many factors  
 which are not yet fully understood.  
 The second is the fact that the  
 system is not a static one, but a  
 dynamic one, which changes  
 as the system evolves.  
 The third is the fact that the  
 system is not a closed one, but an  
 open one, which interacts with  
 the environment.



The system is a complex one, involving many factors which are not yet fully understood.



#### D. Comparative Development

Graph #2, Paperboard Consumption, and Graph #3, Value of Shipments, present an interesting comparison.

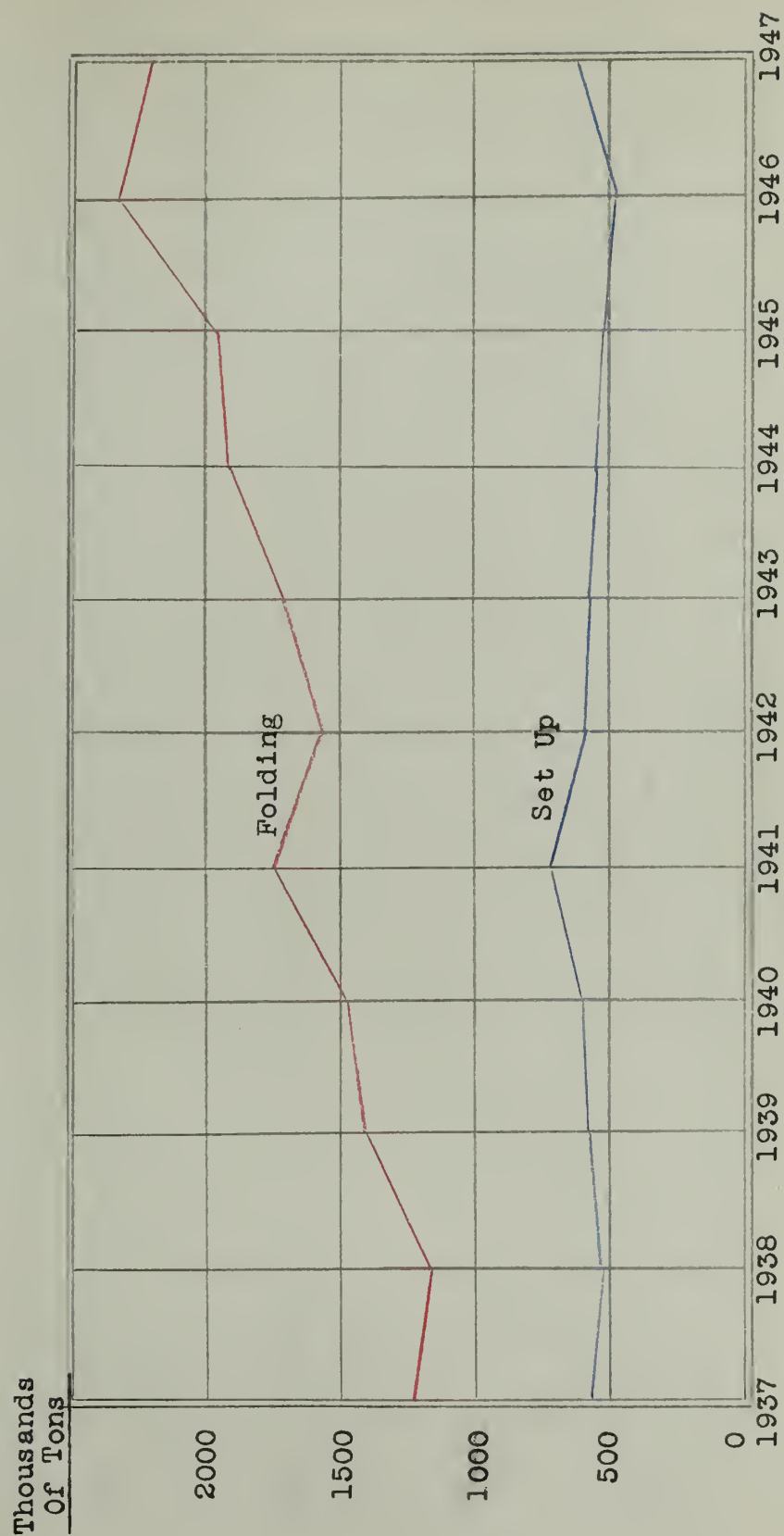
The steady rate of increase in unit production of folding boxes, which might be indicated by paperboard consumption, can be attributed to the ever-developing new uses to which folding boxes are being put. There are literally hundreds of products that were once sold in bulk now appearing in attractive folding boxes. Frozen foods, fruits, vegetables, meats and dairy products now being packaged in new, efficient and decorative folding boxes, are engaged in an intensive battle of brand names. Increasing competition among other products coupled with new uses have been the major factors in keeping the folding carton trend line healthy and prosperous.

Folding box value in 1947 was about 32% higher than in 1946, nearly 2 1/2 times that of 1941 and nearly 5 times that of 1929. On the other hand set up box value in 1947 was about 60% greater than in 1946, about 2 3/4 times that of 1941, and about 3 1/2 times that of 1929. It should be noted, however, that while set up box value has grown considerably, the unit production of the industry has not grown at a similar rate, nor has it grown at a rate relative to unit growth in the folding box industry. Conversely, it may be interpreted that since the set up box value has



## Graph II

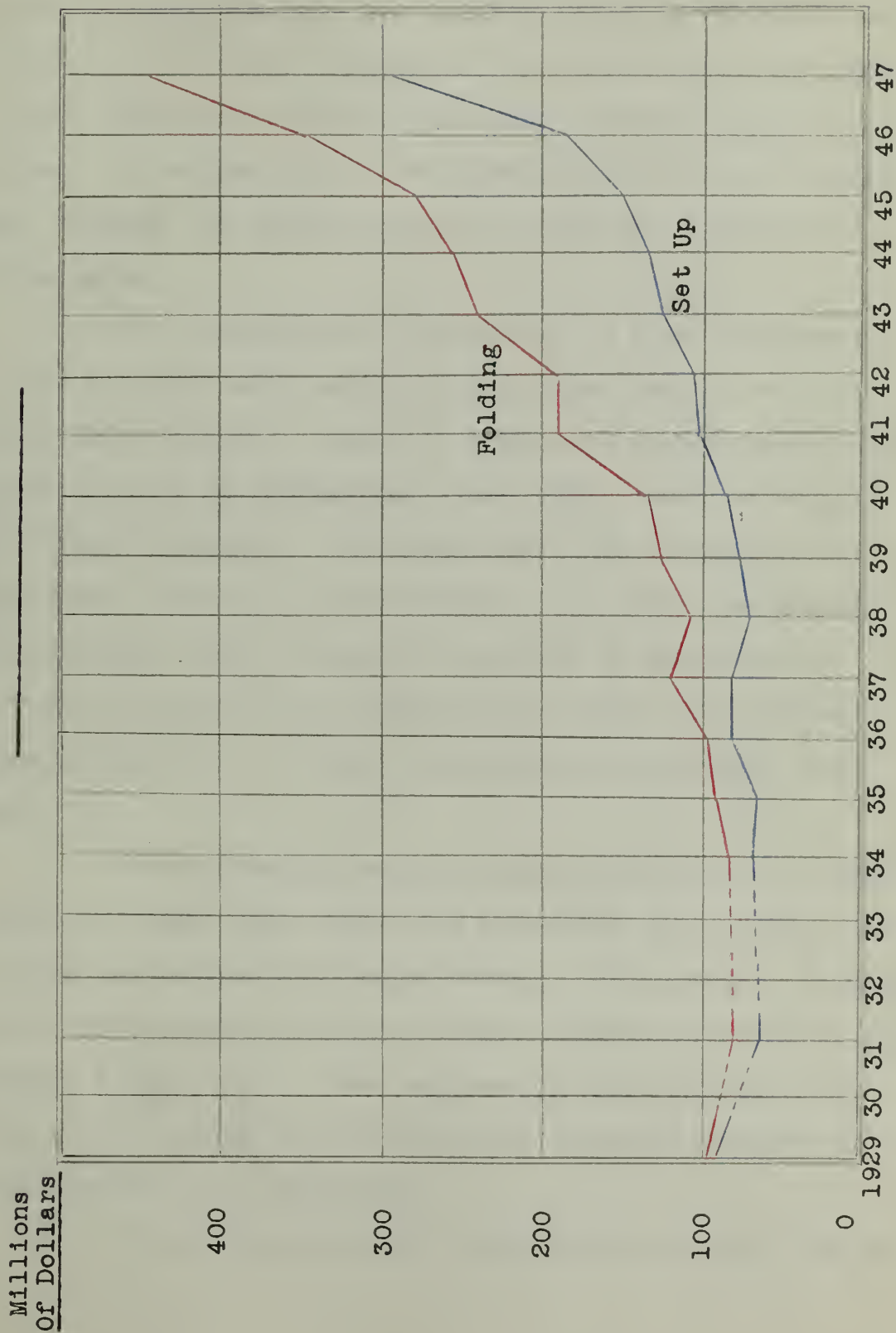
FOLDING AND SET UP  
PAPERBOARD CONSUMPTION  
1937 to 1947



See Table IV., p 43.



Graph III  
 VALUE OF  
 FOLDING AND SET UP BOX  
 SHIPMENTS  
 1929 to 1947



See Table V., p 52.





grown at a greater than proportional rate than unit production of the industry, the industry's sales volume is maintained and increased, apparently by concentration on boxes of more intricate construction, which command higher selling prices. The position of the industry is further strengthened through the added feature of high-cost, transparent containers.

The comparative development of both industries can be depicted more easily by an inspection of the bar graph that follows. Graph IV shows the comparative development of the two industries since 1929, based on tons of paperboard consumed. The peak year 1929 is used as the base year. Here it can be readily seen that the set up box industry shows a distinct tendency to decrease in position relative to its 1929 volume, while the folding industry displays a steady, remarkable improvement over 1929.

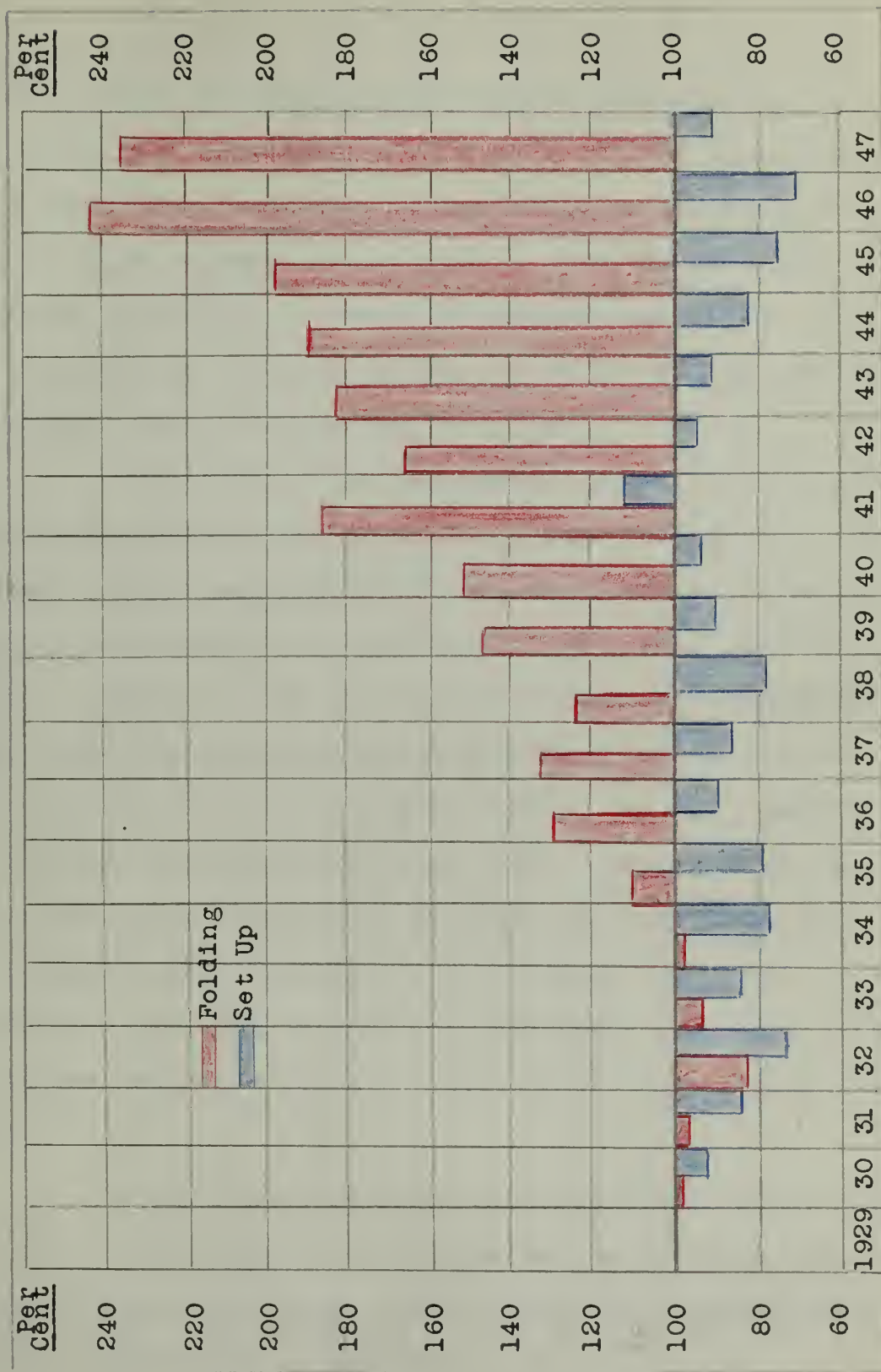
Set up manufacturing methods incorporate a large amount of costly hand labor and expensive distribution involving the shipment of empty boxes. In contrast, folding boxes are produced on large-volume, high-speed machines and shipped folded flat. One can readily appreciate, then, the lack of growth by the set up box industry insofar as unit production is concerned.

The contention set forth previously that the set



Graph IV

COMPARATIVE DEVELOPMENT  
FOLDING & SET UP BOX INDUSTRIES  
Based on Tons of Paperboard Consumed  
1929=100%



See Table VI., p 53.





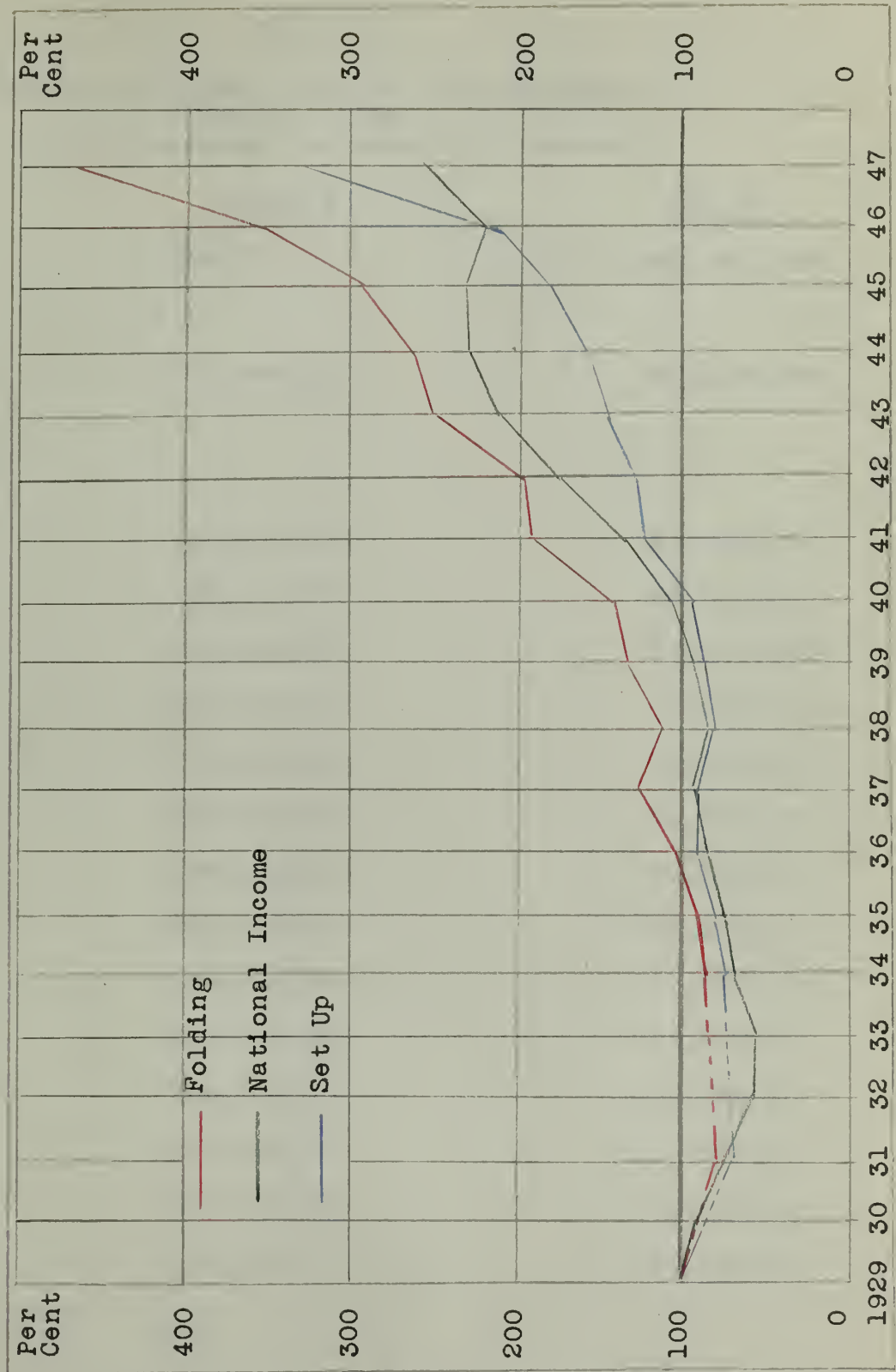
up industry is concentrating on higher-priced boxes of more intricate construction at a more or less declining unit production level and, consequently resulting in a higher sales volume, can be readily seen through an inspection of Graph V. Graph V. compares the dollar volume realized by the folding and set up groups with national income, using 1929 as the base year.

From 1929 to the war years, there is a definite correlation between set up dollar volume and the national income. Paper and paperboard shortages are accountable for the lag between the two trend lines during the war years. However, with the return of necessary decorative wraps and essential paperboard the setup trend was one of rejuvenation with a boom year in 1947. In 1947 the set up industry reached an all-time high. Dollar sales in 1947 were about 3 1/2 times those of the base year 1929, while paperboard consumption, which might indicate unit production, was only 91% of the base year. In 1947, national income reached a point two and a half times greater than 1929.

A bleak picture might be presented from the point of view of unit production for the set up industry, but, from the point of view of a maintained or increased sales volume, the outlook is healthy.



Graph V  
DOLLAR VOLUME OF FOLDING & SET UP  
COMPARED WITH NATIONAL INCOME  
1929=100%



See Table VII., p 54.



Handwritten text, possibly a title or description, located on the right side of the page. The text is illegible due to fading.

Table V

VALUE OF FOLDING & SET UP BOX SHIPMENTS  
1929 to 1947

---

<u>Year</u>	<u>Folding</u>	<u>Set Up</u>
1929	\$95,727,000	\$85,382,500
1930	-	-
1931	75,344,700	60,519,800
1932	-	-
1933	-	-
1934	80,700,000	61,700,000
1935	85,347,000	62,556,200
1936	98,468,000	77,000,000
1937	119,062,000	77,945,300
1938	107,930,000	68,300,000
1939	126,872,700	73,940,800
1940	135,730,000	80,102,000
1941	187,749,000	103,416,000
1942	189,934,000	110,077,000
1943	240,830,000	125,000,000
1944	256,100,000	132,854,100
1945	277,245,000	150,000,000
1946	345,173,000	182,000,000
1947	455,702,500	293,000,000

- Unpublished.

Bettendorf, H. J., Statistical Summary, Fibre Containers, August, 1948., p 104.





Table VI  
COMPARATIVE DEVELOPMENT  
FOLDING & SET UP BOX INDUSTRIES  
Based on Tons of Paperboard Consumed  
1929=100%

---

<u>Year</u>	<u>Folding</u>	<u>Set Up</u>
1929	100.0%	100.0%
1930	97.3	84.3
1931	96.4	84.3
1932	82.5	72.9
1933	93.7	83.9
1934	98.3	76.9
1935	111.0	80.7
1936	128.5	89.3
1937	131.2	86.6
1938	123.2	78.9
1939	146.8	89.0
1940	149.8	93.2
1941	185.4	111.2
1942	165.4	93.6
1943	183.6	91.0
1944	188.9	82.5
1945	198.0	77.8
1946	241.6	72.1
1947	236.5	91.4

ibid., p 104.

# THE ANNALS OF THE ROYAL SOCIETY OF LONDON FOR THE YEAR 1880

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Table VII  
DOLLAR VOLUME OF FOLDING & SET UP  
COMPARED WITH NATIONAL INCOME  
1929=100%

<u>Year</u>	<u>National Income</u>	<u>Value Of Folding</u>	<u>Value Of Set Up</u>
1929	100.0%	100.0%	100.0%
1930	91.1	-	-
1931	75.9	78.6	70.8
1932	59.5	-	-
1933	56.9	-	-
1934	65.8	84.3	72.2
1935	70.8	89.1	73.1
1936	82.3	102.8	90.1
1937	93.7	124.3	91.2
1938	84.8	112.7	80.0
1939	92.4	132.5	86.5
1940	102.5	141.9	93.7
1941	131.6	196.1	121.0
1942	173.4	198.4	128.8
1943	212.7	251.7	146.2
1944	230.4	267.6	155.5
1945	231.6	289.6	175.6
1946	225.3	360.6	213.1
1947	256.9	476.1	343.0

National Income: U.S. Dept. of Commerce.  
Folding & Set Up: See Table V.  
- Unpublished.





## VI. PACKAGING CASE STUDIES

### A. Introduction

This section of the discussion utilizes the experiences of the Polaroid Corporation of Cambridge, Massachusetts and the De Vilbiss Company of Toledo, Ohio as media through which the attributes and limitations of folding and set up boxes are illustrated. From time to time during the illustration of these experiences, the writer will deviate from the main description to exploit salient features that have been presented by the cases at hand. Not only will this treatment emphasize the lessons learned but it will serve to amplify as well as clarify the major advantages of the set up box over the folding box and vice versa. With this approach to the problem, it is designed that the cases with the preliminary discussions will congeal into a thesis summation that will present the considerations that must be analyzed by the packager before he selects either folding or set up for his product.

Before entering into the description and analysis of these packaging experiences, the writer wholeheartedly thanks and praises Mr. David R. Dominie, Package Engineer, Polaroid Corporation and Mr. Dudley Kimball,

THE HISTORY OF THE

REIGN OF

THE GREAT BRITAIN  
FROM THE DEATH OF CHARLES THE SECOND  
TO THE DEATH OF WILLIAM THE THIRD  
IN THE YEAR 1690  
BY JOHN HUGHES  
OF THE MIDDLE TEMPLE  
ESQ.  
LONDON  
Printed by J. Sturges, at the Angel in St. Dunstons Church-yard, 1710.

THE HISTORY OF THE  
REIGN OF  
WILLIAM THE THIRD  
FROM THE DEATH OF CHARLES THE SECOND  
TO THE DEATH OF WILLIAM THE THIRD  
IN THE YEAR 1690  
BY JOHN HUGHES  
OF THE MIDDLE TEMPLE  
ESQ.  
LONDON  
Printed by J. Sturges, at the Angel in St. Dunstons Church-yard, 1710.

Package Engineer, Container Corporation of America for their patience, support and contributions to this report.

#### B. About Polaroid Corporation

The Polaroid Corporation, through its brilliant inventor-president, Edwin H. Land, recently made headlines with a brilliant contribution to photography---The Finished-Picture-in-a-Minute camera. The firm's first claim to fame, however, was the invention of the light conditioner, Polaroid, used in about 125 different products---cameras, sunglasses, sunshields, et al.

In appearance Polaroid is a flexible, transparent light-control film averaging .003 of an inch in thickness which looks and handles like cellophane but is darker. Polaroid gets its name from the fact that it polarizes light waves, that is to say, gives them a definite direction as they pass through it. This film has millions of precisely aligned light-control molecules that "absorb" annoying reflected glare. It permits only the useful "seeing" light to pass through.

#### C. Polaroid Corporation is Introduced to the Folding Carton

Because the nature of their product demanded protection as a prime packaging requisite, the Polaroid





Corporation packed all of their products in set up boxes right from the beginning of their existence in 1936, believing that the set up carton was the only form they could use to acquire strict protection.

Their cartons and inner packing had to be of such a construction as to prevent any possible shifting of the contents or movement of the box on the diagonal. In short, the carton had to be utterly rigid to prevent scarring the surfaces of Polaroid glasses, lenses, shields, etc. The carton had to be as rigid as possible to prevent curling of the contents as well as scratching.

The Polaroid Corporation enjoyed success right from its inception. It was not long before Polaroid products were being shipped around the globe. The lengthy time in transit and the added handling due to re-routing further demanded a paperboard box that provided the maximum in protection.

As the years went by, and Polaroid Corporation's sales volume increased, the value of the protection providing set up box became ever-more important. Polaroid was being delivered with damage at a minimum.

But, with the increase in volume came an increase in costs. The nature of the increasing costs demanded strict surveillance of all costs, packaging costs in par-





ticular because expense had not been spared to prevent faulty, ill-will breeding merchandise from falling into the hands of consumers.

Inner packing could not be sacrificed or improved upon insofar as costs were concerned. That left the outer shell, the box itself, to consider.

All the while, Mr. Dudley G. Kimball had been claiming that his product, the folding box, could provide as much protection and rigidity in structure as the sturdy set up boxes were providing, and, more importantly, at a lower unit cost plus storage cost savings.

The combination of Mr. Kimball's claims and Polaroid Corporation's high packaging costs demanded a challenge. Consequently, Polaroid Corporation's experiment with folding cartons began in the fall of 1945.

The Polaroid Day-Driving Automobile Visor which was being packaged in a .035 chipboard set up box was selected as the experimental product. The set up box cover was decorated with a seven-color lithographed wrapper. The bottom of the box was wrapped in plain white paper. The package also included a separate place-holder insert plus a separate "directions insert". A sample of the product and a set up box, as pictured on the following page, were turned over to Container Corporation's Packaging Laboratory in Medford, Massachusetts.

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Figure 9.



Set Up Box Used by Polaroid  
Corporation in 1945 for Auto-Visors.





Container Corporation's designer's in collaboration with Mr. Kimball expressed the demands of rigidity and display required by the product in the form of the Simplex style two-piece telescope folding carton shown below:

Figure 10.



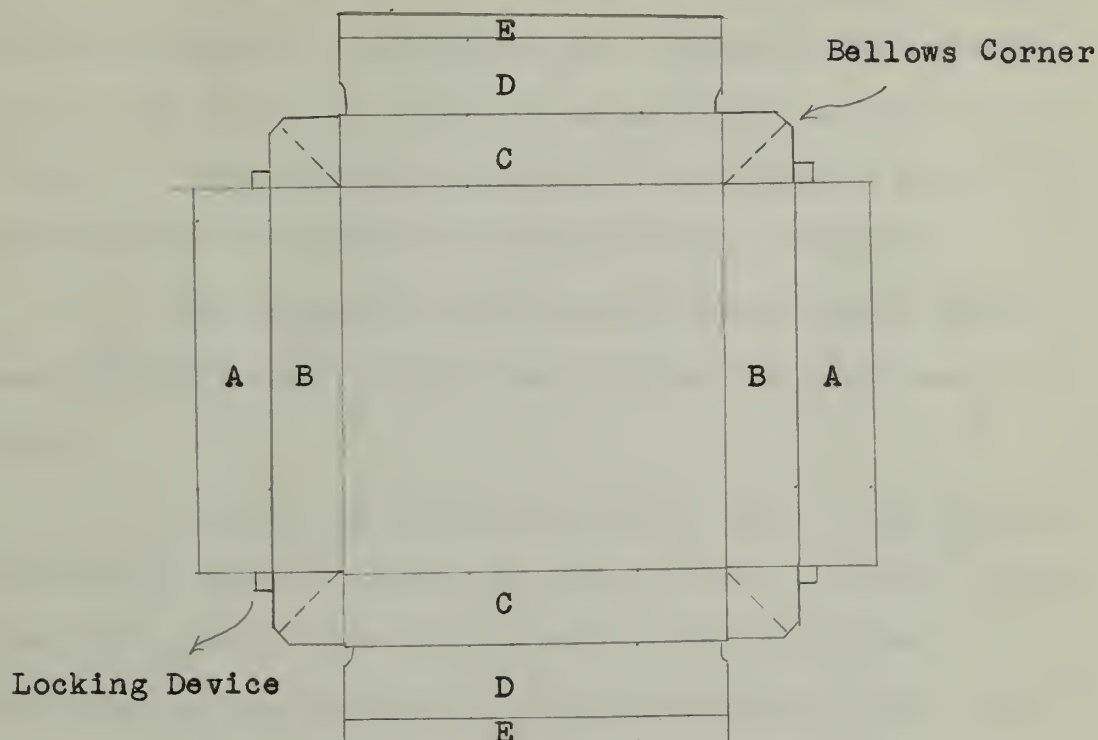
Folding Box Adopted by  
the Polaroid Corporation

...the ... of ...  
...the ... of ...  
...the ... of ...  
...the ... of ...



...the ... of ...

Figure 11.  
Simplex Style Folding Carton



Assembling Instructions

Panels "A" are "ended", that is to say, folded and glued to panel "B" in the manufacturing process. To erect the Simplex style carton, the side panels "A-B" are held erect; the bellows corners are folded inward; end panel "D" is folded over "C". Tab "E" will then rest on the bottom of the box and nest under the lip of side panel "A". Simultaneously, the locking device off of panel "A" acts as such under the score between "C" and "D".

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The bottom of the Simplex folding box as pictured on page 60 incorporates the "place-holder" insert of the set up box it replaced as an integral part of itself. This feature eliminated the printing costs involved with the separate insert for the set up box.

The Simplex carton brought about other initial manufacturing cost savings over the set up box previously used.

The lithographed wrapper on the set up box was made up of seven colors; red, blue, black, yellow, brown, gray and green. The letterpress printing process on the folding box cut this down to five colors; red, blue, yellow, maroon and an overall varnish. Consequently, with the use of valuable white space, the folding carton had more eye-appeal than the box it replaced. However, this is not to be construed as a direct advantage of folding over set up, but a case where the artist's ingenuity resulted in a saving for the Polaroid Corporation.

In direct contrast, the folding boxboard used was of a lighter weight resulting in board cost savings. How can lighterweight board provide as much protection as the heavier board used in the set up box? Specifically, in that the Simplex style carton is constructed with reinforced, glued sidewalls and reinforced, folded end walls.





The Simplex box is held in an erect and rigid position by means of an inner friction pinch and a self locking device between the side and end panels in each corner of the carton. The bottom of Polaroid's Simplex box is constructed along similar lines as the cover with the exception that the bottom part of the box incorporates the "place-holder" insert as an integral part.

Insofar as the direct savings are concerned, the comparison of the new box versus the old box has shown that economies resulted from the eliminated printing in the case of the set up box's insert and in the use of a less expensive, lighter weight boxboard. In themselves, these savings amounted to a respectable sum in the long run, without sacrificing protection. Mr. Kimball had pointed out to Polaroid's Mr. Dominie that, along with these savings, a case of 250 Simplex style cartons would take up no more space than 20 of his present set up boxes. This would and did mean a reduction of a great part of storing costs.

#### D. Price Factor

Thus far the direct comparison has shown that a folding carton for this particular product will provide as much protection as a set up box with savings in board,



insert printing and storage costs. However, no mention has been made of the volume in which this style would have to be purchased to gain the price benefits inherent to the folding box. In placing set up box orders, Polaroid Corporation had been purchasing in lots in keeping with their storage facilities---lots large enough to gain the most economic unit price from the set up manufacturer, namely ten thousand units---and in accordance with their production schedule. In order for them to gain the price benefit of the folding box, Polaroid would have to order in much larger quantities. Large unit purchases, normally fifty thousand and over, are required by the folding box manufacturer because of high initial costs common to most mass producing industries.

Set up box prices are lower than folding box prices for a box of like design and quality in quantities of less than fifty thousand units, and sometimes for larger quantities. Over fifty thousand, set up prices tend to level off. The price behavior in the set up box field is attributed to high variable expenses and low fixed costs. The additional expenditure necessary to produce each additional unit over approximately fifty thousand units remains comparatively constant in the set up box industry. In the folding box group, low variable





expenses and high fixed costs result in decreasing unit prices with increasing production over approximately fifty thousand boxes. In short, folding box prices normally cannot compete with set up box prices under fifty thousand for a similar unit. Folding box prices, for similar units, can meet set up box prices when combination runs are made up. A combination run is a composite production process wherein a group of orders, using the same style carton and printing inks, are combined into one production order.

Since the Polaroid Corporation used about a half-million auto-visor boxes a year, they found it economical to order the Simplex style folding carton in place of the set up box they were using.

In use the new box accomplished what it had promised to do in theory, thus clearing the path for the introduction of folding cartons to some of Polaroid Corporation's other items.

Before going into a discussion of the adaptation of folding cartons to some of Polaroid Corporation's other products, further experiments made with the auto-visor package will be described.

#### E. The Frame Vue Folding Carton

About six months after Polaroid Corporation

The following is a list of the names of the persons who have been elected to the office of Justice of the Peace for the year 1900. The names are given in alphabetical order of their surnames. The names of the persons who have been elected to the office of Justice of the Peace for the year 1900 are: [illegible text]

adopted the Simplex carton, Container Corporation's Packaging Laboratory came up with the novel Frame Vue style folding carton. The Frame Vue box is described as a new method of merchandising products in a folding box in such a way that the presentation of the product contributes to its greater sales appeal. Just as the framing of a picture adds to its total effectiveness, so does the double wall feature in Frame Vue add something to the value of the merchandise it contains.

A photograph of the Frame Vue folding carton appears on the following page.

Its protective features are self evident, enabling the box manufacturer, because of its construction, to use much lighter weight board in all cases in order to produce the equivalent and even greater strength of heavier boxboards. By virtue of the fact that lighter paperboard can be used, manufacturers can compensate for the extra amount of board necessary to produce this style carton.

The construction of the Frame Vue carton gives the package not only greater strength, but protects the contents because of the cushioning effect of the double walls. This makes Frame Vue particularly desirable in packaging such fragile items as precision instruments, electrical devices, glassware, food products, cookies, candies, etc.



Figure 12.



Top and Side View of Frame Vue Tray,  
with sleeve cover, adopted by Polaroid.



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LIBRARY

Besides the framing feature of Frame Vue, the top sides of the walls all around provide space for decoration and design. What is still more important, these walls can be used for identification of the product by brand name, thus enhancing the advertising value of the product by means of the package. The walls can also be used to bring to the attention of the buyer, short effective sales features of the product. In the ordinary type single wall folding and set up cartons, this is usually done on the lid, but when the lid is removed for customer inspection of the merchandise or for display, the connecting link between sales message on the lid and the product is broken. This is not so with the Frame Vue style folding carton, because brand identification and important selling features can always remain together.

As can be seen from the photograph on a previous page, the Frame Vue folding carton was adopted by the Polaroid Corporation. The valuable selling features of the Frame Vue plus the fact that it was still less expensive than the original set up box yet a bit more expensive than the Simplex carton it replaced, were irresistible.

Polaroid Corporation's plan to survey packaging costs was to cut costs without sacrificing protective strength or sales appeal. In the case where the Frame



Vue displaced the Simplex, costs were increased, but, savings were still being made over the original set up box costs. In this respect, Mr. Dominie disclosed that even though a saving was realized in comparing actual unit costs of folding and set up, this saving was almost eliminated by the increased labor cost to set up the Frame Vue carton.

"We found that many companies using Frame Vue secure an hourly rate of speed of between 250 and 350 per hour in erecting the Frame Vue part of the box." (1)

This placed the price of the Frame Vue folding carton and the original set up box on almost an even basis. Storage cost savings, however, were still gained.

The wisdom of the decision to purchase the Frame Vue seems apparent after a realization of the Frame Vue carton's virtues, for auto-visor sales increased appreciably almost immediately after the new package hit the counters and window displays.

The Frame Vue manufacturer has frequently found that a unit consisting of a Frame Vue tray and a Simplex or sleeve cover is comparable in cost with two piece set up boxes where the bottom and the top have been paper-wrapped and the lid printed. More often they have found

(1) Sales Promotion Dept., Container Corp. of America, Chicago, Illinois.





that their cost is even lower where the quantity is large enough for economical folding box manufacture. However, where an effort has been made by the set up box manufacturer to secure framing in the walls or some other novelty in shape and design simulating the appearance of a Frame Vue carton, the latter is about one-third or one-fourth the cost of the set up box.

#### F. A Case Study Within a Case Study

The De Vilbiss Company of Toledo, Ohio presents an excellent case study for this comparison in that it demonstrates that a folding box such as the Frame Vue can be sold to a prospect who makes its own set up boxes.

The De Vilbiss Company's first reaction naturally was negative because they had their own set up box factory. However, the samples of other merchandise packaged in Frame Vue that were shown them were so attractive that they finally consented to allow Container Corporation's Packaging Laboratory to have one of their items to make up a package to see how it would look in a Frame Vue construction.

The hand-made sample designed by the laboratory was such an improvement over De Vilbiss' set up package



that they called in their advertising agency for their opinion. They too were enthusiastic and agreed that Frame Vue enhanced the merchandising appeal of the product greatly, but again the question arose: why have boxes made elsewhere when we have an investment in a box plant of our own? To which the advertising agency replied: "After all, your primary interest is in selling your product, not making boxes. If you do not adopt this package and your competitor does, he will secure an advantage that you should not permit him to have." On the strength of this argument, the De Vilbiss Company decided to try out several of their products in the Frame Vue.

The results from the initial test were so satisfactory from a sales standpoint that now all of their retail products such as perfume atomizers, vaporizers, perfume bottles, medical atomizers, etc., are packed in Frame Vue.

The De Vilbiss Company's box plant is now being used only for their small production runs of five to ten thousand units.

#### G. Further Use of Folding Cartons by Polaroid

The two discoveries made by the Polaroid Corporation in its experiments with folding cartons for its auto visor were, 1) the folding carton will provide as much

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DEPARTMENT OF THE HISTORY OF ARTS  
AND ARCHITECTURE  
OFFICE OF THE CURATOR  
OF THE MUSEUM OF ARTS  
AND ARCHITECTURE  
CHICAGO, ILLINOIS  
JANUARY 10, 1911  
TO THE HONORABLE  
THE PRESIDENT OF THE UNIVERSITY  
OF CHICAGO  
SIR:  
I have the honor to acknowledge  
the receipt of your letter of  
the 10th inst. and in reply  
to inform you that the  
same has been forwarded  
to the proper authorities  
for their consideration.  
Very respectfully,  
J. H. COOPER, Curator.

THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF THE HISTORY OF ARTS  
AND ARCHITECTURE  
OFFICE OF THE CURATOR  
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for their consideration.  
Very respectfully,  
J. H. COOPER, Curator.



protection as the set up box insofar as their auto visor was concerned, and, 2) that the folding carton is more economical provided orders are placed in quantities of over fifty thousand boxes.

The second revelation for them, large orders, could be applied to most of their products. However, the question remained; would the folding box provide as much protection as the set up box for all of their large volume items. This remained to be tested.

Another product was then selected; prescription lenses for Polaroid Sunglasses. This product was being packaged and distributed throughout the United States in a sturdy, rigid set up box wrapped with two-color lithographed paper.

Prescription lenses demanded an even more rigid package than most Polaroid products due to the fact that some 25 pairs of lenses were packed in a single row. The volume of boxes purchased for this product were more than adequate to take advantage of the economical, mass produced folding box.

The Packaging Laboratory was once again called upon to select and design a folding carton in keeping with the characteristics of the product being packaged.

A Reverse Tuck style carton constructed of





Patent White Kraft Back paperboard was selected as not only the most economical but of sufficient rigidity in structure to provide adequate protection to the contents. The Kraft content in the board furnish was added to give more body and strength to the board, resulting in a stronger carton.

The Reverse Tuck style folding carton is considered the ace of all folding boxes. It is the most economical to manufacture. There is no waste of paperboard, because a perfect nest is achieved when each pattern is laid out on a sheet of paperboard. (1) The perfect nest of the Reverse Tuck carton also means more economical die costs, and very little stripping expense when the pattern is removed from the form.

Another important feature of the Reverse Tuck carton is its ease of setting up, either manually or by machine. It is widely used for shaving and dental cream in tubes, cough drops, five-cent candies, and hardware items.

A diagram and photograph of the Reverse Tuck box may be found in the Folding Carton Pictorial Review section of this report.

Before ordering a large quantity of these boxes,

(1) Studley, J. D., Folding Paper Boxes., Washington, D.C. U. S. Department of Commerce, 1939.



Polaroid Corporation purchased a hundred unprinted boxes made of the specified paperboard for experimental purposes. The unprinted boxes were first packed and then mailed, trucked and shipped by rail to various distributors throughout the country with the request that they report the condition of the contents and box upon arrival. All one hundred samples reached their destinations in perfect condition. From the successful results of this experiment, Polaroid Corporation ordered a substantial quantity and discontinued the set up box for this product. In actual use the new carton matched the protective qualities of the set up box previously used while being purchased at a more economical price.

#### H. Folding or Set Up Boxes?

With the success of the Simplex, Frame Vue, and the Reverse Tuck folding cartons, the question whether to use folding or set up cartons for Polaroid Corporation's entire line presented itself. In order to arrive at the proper decision, each product was analyzed with the following questions and problems in mind:

1. Will present volume justify the purchase of a folding carton for this product?
2. Will a folding carton provide adequate





protection for this product against scarring, breakage, tampering, and curling from the point of manufacture on through to the point of consumption?

3. Can a particular style of folding carton reflect the quality of the product?
4. How are our competitors packaging similar products? Will a change in design gain or lose competitive position?
5. What is the profit margin on this product? How much can we spend for packaging?
6. Ease and economy in handling, packing and shipping.
7. Methods of handling and displaying this product at the retail level.
8. For how long a period does the ultimate consumer retain the package?
9. Availability of storage space.
10. Can the folding carton manufacturer, whose average delivery time is four to six months, meet our production schedule? Or,

1. The first part of the paper discusses the importance of the study of the history of the United States. It is argued that the study of the history of the United States is essential for a full understanding of the country and its people. The paper then goes on to discuss the various methods of studying the history of the United States, including the use of primary and secondary sources, and the importance of critical thinking and analysis.

2. The second part of the paper discusses the role of the United States in the world. It is argued that the United States has a unique role to play in the world, and that it is essential for the United States to maintain its leadership in the world. The paper then goes on to discuss the various ways in which the United States can maintain its leadership in the world, including the use of military power, economic power, and cultural power.

3. The third part of the paper discusses the future of the United States. It is argued that the United States has a bright future, and that it is essential for the United States to continue to maintain its leadership in the world. The paper then goes on to discuss the various ways in which the United States can continue to maintain its leadership in the world, including the use of military power, economic power, and cultural power.

4. The fourth part of the paper discusses the importance of the study of the history of the United States. It is argued that the study of the history of the United States is essential for a full understanding of the country and its people. The paper then goes on to discuss the various methods of studying the history of the United States, including the use of primary and secondary sources, and the importance of critical thinking and analysis.

5. The fifth part of the paper discusses the role of the United States in the world. It is argued that the United States has a unique role to play in the world, and that it is essential for the United States to maintain its leadership in the world. The paper then goes on to discuss the various ways in which the United States can maintain its leadership in the world, including the use of military power, economic power, and cultural power.

6. The sixth part of the paper discusses the future of the United States. It is argued that the United States has a bright future, and that it is essential for the United States to continue to maintain its leadership in the world. The paper then goes on to discuss the various ways in which the United States can continue to maintain its leadership in the world, including the use of military power, economic power, and cultural power.

11. Will the set up manufacturer's ability to manufacture and deliver small or large amounts daily or weekly best meet our production schedule and requirements?

Many candy manufacturers, who change their candy bar sizes from time to time, find that consideration #10 precludes the possibility of their using folding boxes. The set up box manufacturer best meets the confectioners needs because he can make size or style changes from day to day.

Although it was found that the folding carton would provide adequate protection in the cases tried, it was agreed by the box maker and the Polaroid Corporation that in the long run the set up box would provide more protection. This was and is true of shipments made to foreign countries where excessive handling in transit, changing weather conditions and sundry circumstances require the maximum in protective strength. In the cases where volume justified the packaging of the item in a folding carton and the product was undergoing extra handling, set up boxes were used for foreign trade and folding for domestic distribution.

After analyzing their product line consisting of some 125 items, it was found that the volume of 31 products



made them eligible for folding carton packaging. The processing of these 31 items through the remaining ten considerations disclosed that four of these products demanded set up boxes or if possible a package that had both the protective advantages of the set up box and the price advantage of the folding box.

A description of the manner in which these products were finally packaged will serve to further illustrate the attributes of the set up box and introduce the Metal Edge Box to this discussion.

#### I. Camera & Exposure Meter Set Up Boxes

Two of the four products, cameras and exposure meters, demanded set up cartons because of the maximum protection needed and because their value and competitive position rated an impressive package.

The Finished-Picture-In-A-Minute Camera and the Exposure Meter were packaged in expensive, sturdy, inner and outer wrapped set up boxes with "place-holding" inserts. These containers, as shown in the photograph on the following page, provide all of the many advantageous features of the set up box.

If the reader were to inspect these two packages





Figure 13.



Polaroid Corporation's  
Camera and Exposure  
Meter Set Up Boxes.



on the retailer's counter, shelf or in his window display he would see at first hand the luxurious effect of the leather-simulated wraps; the "moisture-vaporproof" linings; the unique display value of the centerpiece "place-holder" in the exposure meter box; the novel cover arrangement of the camera box; and, by actually feeling the box appreciate not only the progress of embossed paper manufacturers, but the general sturdiness and permanence of the box itself. These two set up boxes are truly excellent samples of which the set up box craft can be justly proud.

The camera box is actually a double-box. The inner container is lined with "moisture-vaporproof" paper for the protection of the camera against inclement conditions, etc. The outer shell is a two-piece neck or shoulder style set up box. The inner container is glued to the outside shell.

The retail value of the camera and the exposure meter as well as the fact that they are displayed with competing items which are merchandised in leather carrying cases or impressive set up boxes demanded that, even though they were volume items, they be packaged in more than adequate set up boxes to maintain a competitive position on the dealer's counter, shelf or in his window. Along with these attributes of the set up box, the camera and meter

THE HISTORY OF THE  
CITY OF BOSTON  
FROM THE FIRST SETTLEMENT  
TO THE PRESENT TIME  
BY  
JOSEPH NEALE  
OF THE BOSTON BAR  
IN TWO VOLUMES  
VOL. II.  
BOSTON: PUBLISHED BY  
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PRINTING OFFICE OF  
J. NEALE, NO. 10, NASSAU ST.  
1845.



inherited the inherent packaging advantages of the set up box, namely, protection, dual-use, permanence and eye-appeal.

#### J. Metal Edge Boxes

With the packaging of the camera and the exposure meter in set up boxes, Polaroid Corporation was left with two volume items to package---the Industrial Safety Goggles and the Dark-Adaptor Goggles.

Both of these items were distributed through the same channels, industrial supply houses, hardware stores, etc. The manner in which they were merchandised did not require lavish or unique containers. Their prime packaging requisite was protection, but in no way excluded the necessity of an eye appealing carton.

Folding cartons, on the one hand, would not provide the degree of protection necessary and the set up box, on the other hand, could not be purchased at a unit price in keeping with the volume purchased. These complex reasons required a package of paradoxes. The metal edge box is just such a package. Firstly, it is not so much a package as a method of packaging. Secondly, though in its finished state it is definitely and stoutly a set up box while in its unfinished state it is a folding box and is generally

the following is a summary of the results of the investigation  
conducted by the committee on the subject of the

### REPORT OF THE COMMITTEE

The committee has the honor to acknowledge the receipt of the  
report of the subcommittee on the subject of the  
investigation conducted by the committee on the subject of the

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report of the subcommittee on the subject of the

classified as such. The fact is, the metal edge box belongs in both classifications.

Reduced to simplest terms, the packaging method is a method whereby boxes are shipped to the customer's plant in the flat; then assembled on a stayer in accordance with his daily requirements. A pictorial description of this method may be found in the Appendix.



Fig. 14. Metal Edge Box

As in the case of most folding box styles, metal edge boxes are often assembled or "made up" as a step in a production line.

Since no adhesive is employed, box edges stand up under humid conditions which tend to break down other boxes. The boxes are also unappetizing to vermin.

THE FIRST PART OF THE HISTORY OF THE  
LIFE OF THE LATE LORD OF THE TREASURY  
OF THE KINGDOM OF GREAT BRITAIN  
AND IRELAND  
AND OF THE  
COUNTY OF PALMERSHIRE  
BY  
JAMES OAKLEY, ESQ.  
OF THE MIDDLE TEMPLE, ESQ.  
IN TWO VOLUMES.  
LONDON:  
PRINTED BY J. JOHNSON, ST. PAULS CHURCH-YARD, 1795.



THE SECOND PART OF THE HISTORY OF THE  
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The quality of the fibreboard makes possible fine printing effects. The appearance of two and three color printing can be achieved with one and two impressions when colored board is used. Both board and metal stays are available in a range of colors.

Employing one basic system, metal edge boxes of many sizes and styles may be produced. They may be practically any length and width, and may be one to twelve inches deep.

With the selection of the metal edge box as the answer to the packaging of the Industrial Safety Goggles and the Dark-Adaptor Goggles, the Polaroid Corporation completed the reconstruction of their packaging methods.



Fig. 15. A Composite View of Folding & Set Up,  
Metal Edge Boxes in Right Foreground.







Figure 16.

A Few of Polaroid Corporation's Set Up Boxes.



Figure 17.

A Few of Polaroid Corporation's Folding Boxes.



## VII. THESIS SUMMATION

The conclusions that have been drawn from the study of the packaging experiences in this thesis cannot, by any stretch of the imagination, be construed as the ultimate answer to the objective of this study. There is no ultimate answer. A definite boundary line cannot be drawn between the two forms of packaging highlighted in this study. The limitless variations that each form can physically take precludes the possibility of a boundary line being drawn between them.

Many of the attributes of each form of package discussed can be duplicated by the other. Nevertheless, each has certain advantages which a prospective user must consider when choosing between them. Under certain circumstances, set up is better than folding for a particular product. A change of one or more of the considerations would dictate the selection of the folding form for the same product. A set up paper box can replace a folding box and vice versa.

An academic definition will not supply the answer as to when one shall replace the other.

The decision to replace one with the other can only be arrived at by a thorough examination of all the aspects peculiar to the particular packaging problem.





Thus, in short, there is no panacea to the problem----

Folding or Set Up?

The collective opinion of the most reputable set up and folding box manufacturers in this area is that the best that can be contributed by this analysis is an intelligent and unbiased appraisal of both forms of packaging along with a sincere examination and exposition of the considerations that manufacturers must analyze when selecting the ideal package of the two forms for their particular product.

The contentions presented herein do not discount, nor are they meant to minimize, the meritorious contribution of the packaging cases exploited in this thesis. The cases studied have made major contributions; first, in the conclusion that a definite line of demarcation cannot be drawn; and, second, they have brought to light the considerations that prospective users must take into account and analyze when deciding which form is best suited to their particular packaging requirements.

What are these considerations?

1. Is production of the product large enough to gain the economies offered by the folding box?



2. Will a folding box or a set up box best meet our handling, packing and shipping methods?
3. Is our product subject to seasonal variations?
4. If this product is subject to seasonal variations, does the folding carton or set up carton manufacturer's delivering and pricing practices best meet our production schedule and packaging budget?
5. Can the folding box manufacturer, whose average delivery time is four to six months, meet our production schedule? Or,
6. Will the set up manufacturer's ability to manufacture and deliver small or large amounts daily or weekly best meet our production schedule and product requirements?
7. Can our storage facilities accomodate set up boxes and still meet our production requirements for boxes?
8. Which form best identifies my product in a manner consistent with the quality of the merchandise and the character of our establishment?



9. Methods of handling and displaying the product at the retail level.
10. How are our competitors packaging their product? Will a change in design gain or lose competitive position?
11. Which form offers maximum convenience to the consumer at the time of opening, during use, and as a storage container when required?
12. Which form is best able to provide protection to my product against all hazards to which it is likely to be subjected at any time?

After deciding which form is best suited to his product, production methods and budget, the manufacturer can then select one of the myriad of styles that will best house the characteristics of his product.

The style selected will differ with types of products and with types of display to which the products are subjected. Product characteristics such as the weight of the product, size, shape, value, class of merchandise, packing requirements, protection needed and general appearance are style and design factors. Then also, consumer and dealer handling, trade tradition and decorative effect



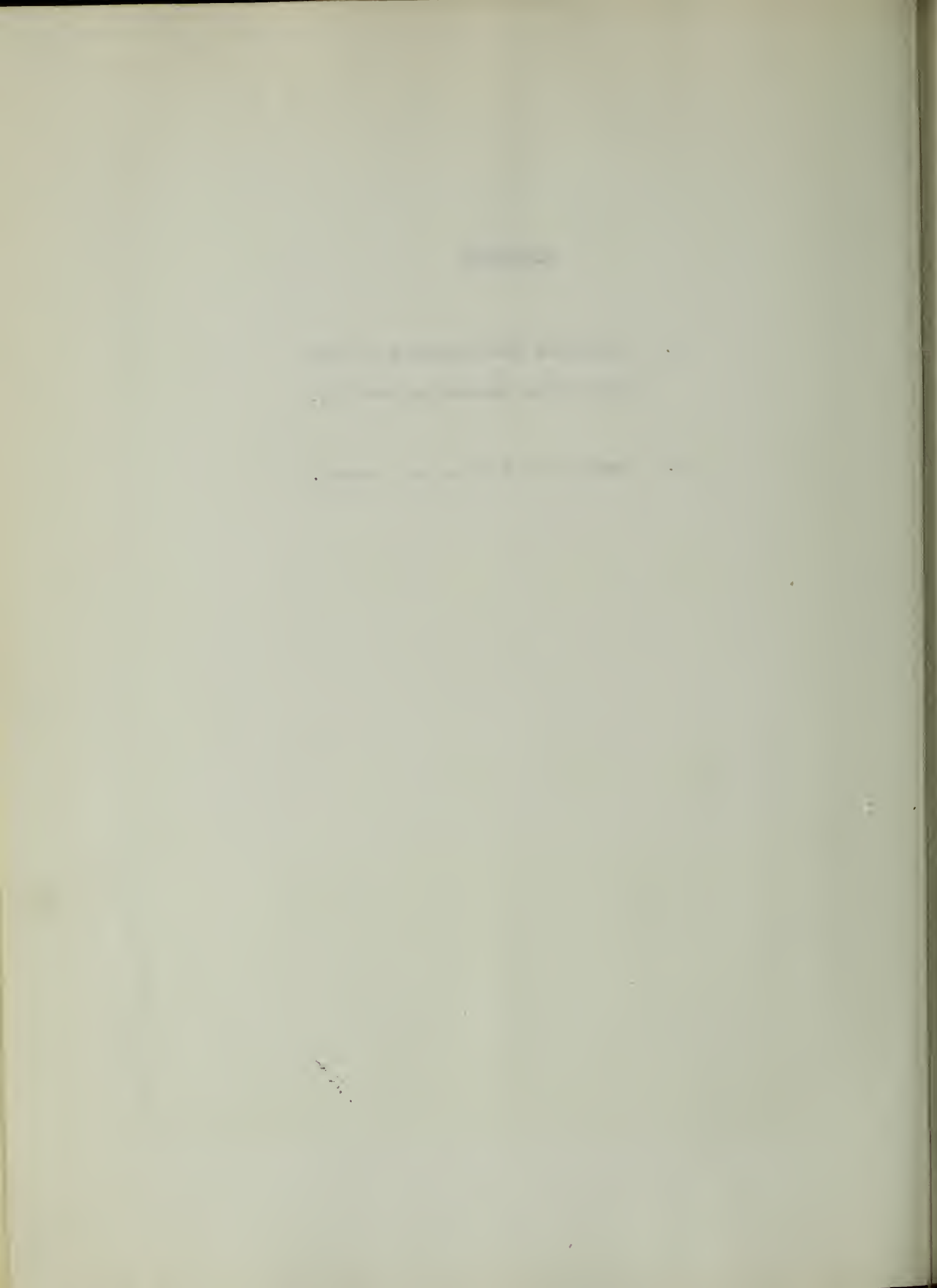


desired are other factors to be considered in the style and design selection.



## APPENDIX

- A. Pictorial description of the  
metal edge packaging method.
- B. Samples of set up box wraps.



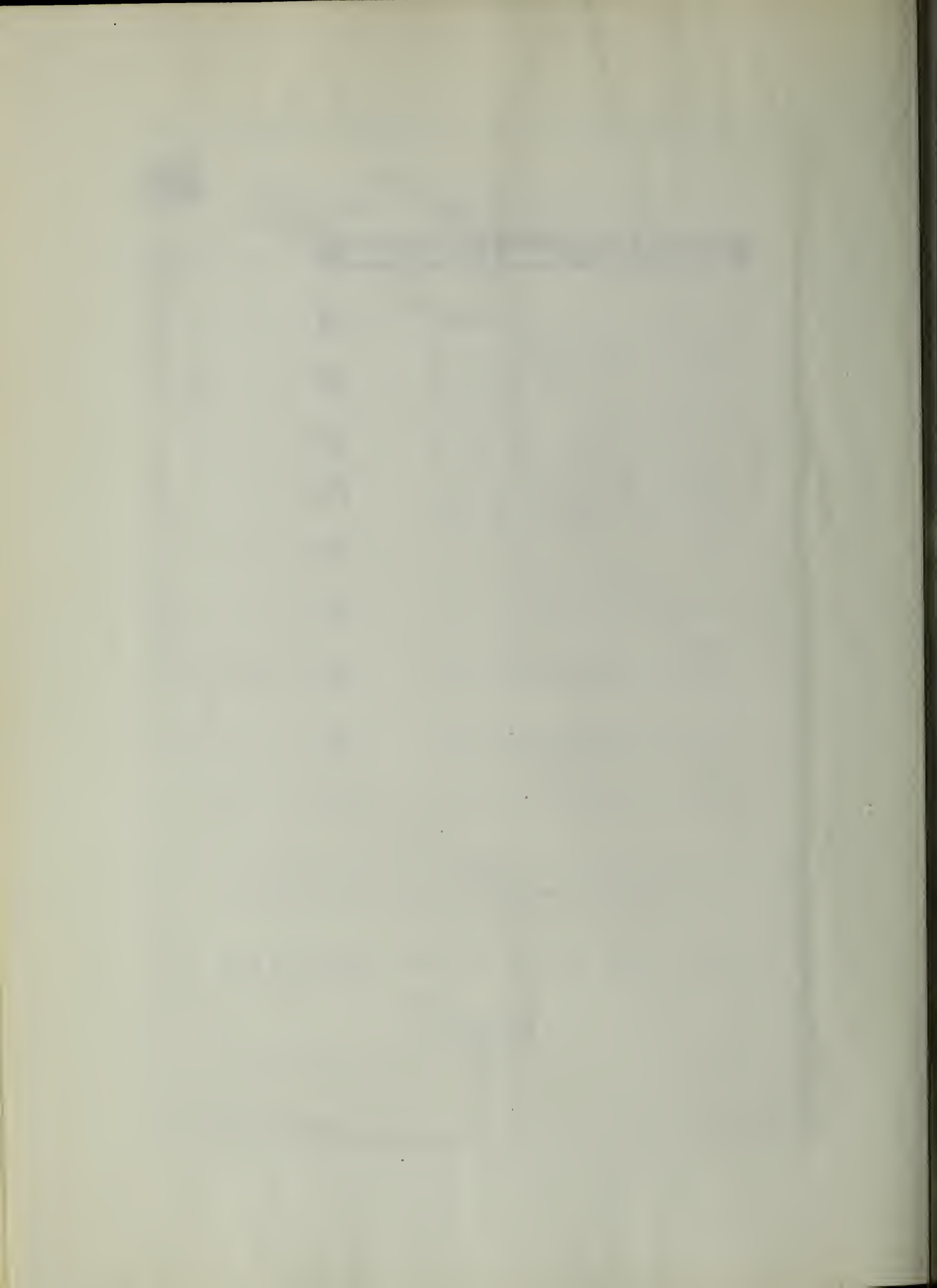


METAL

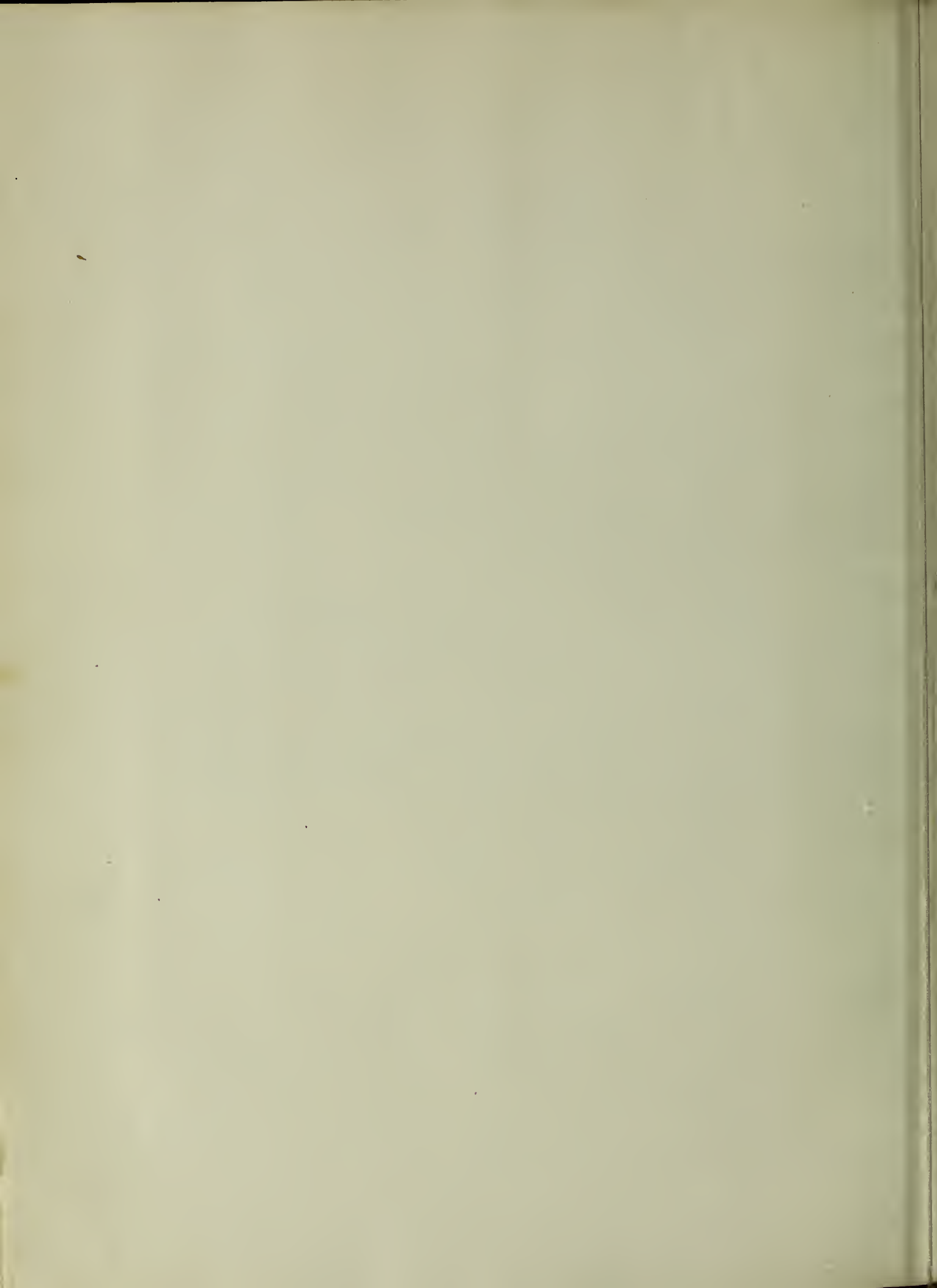
EDGE

*the Engineered  
Method*

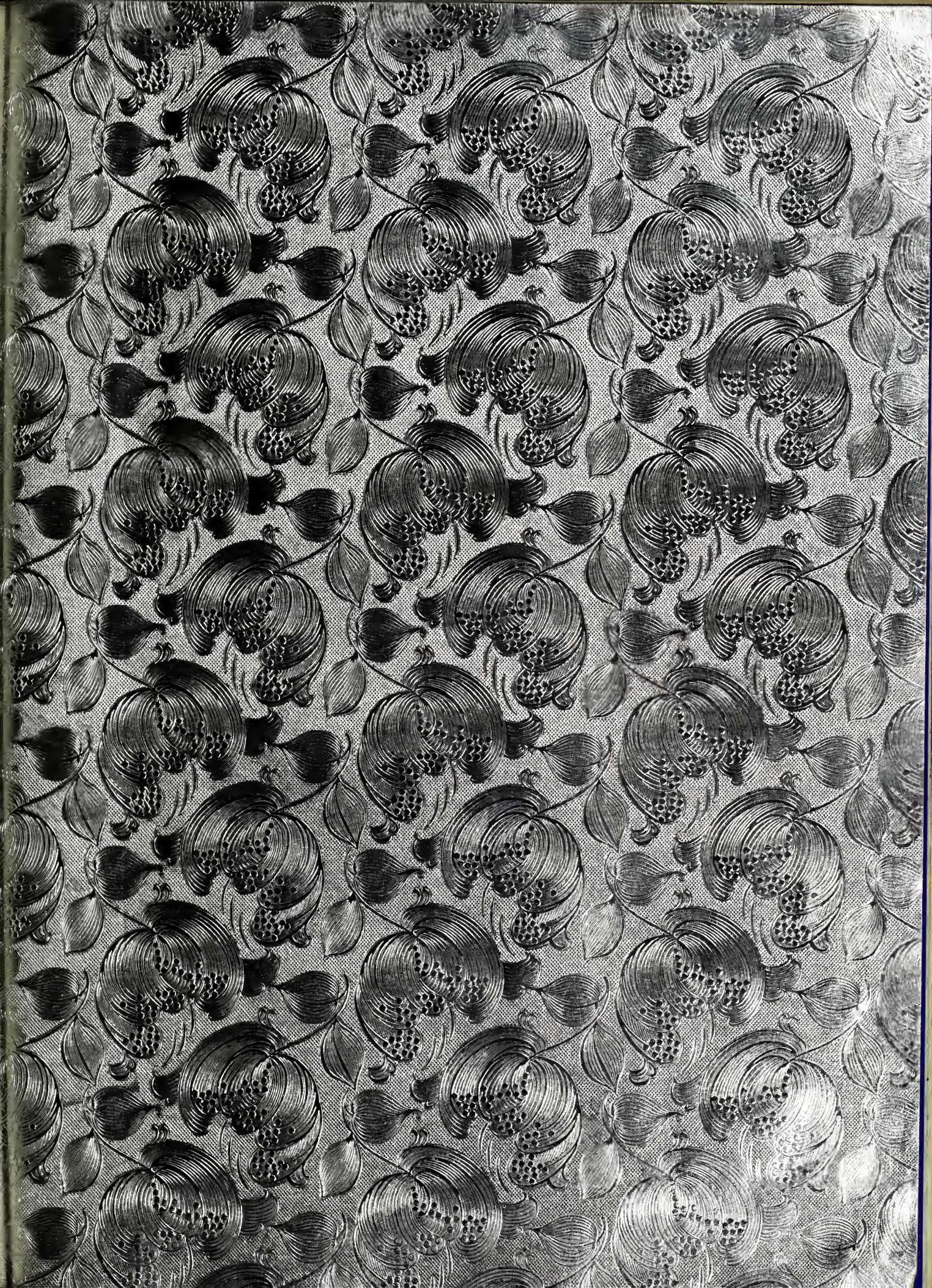




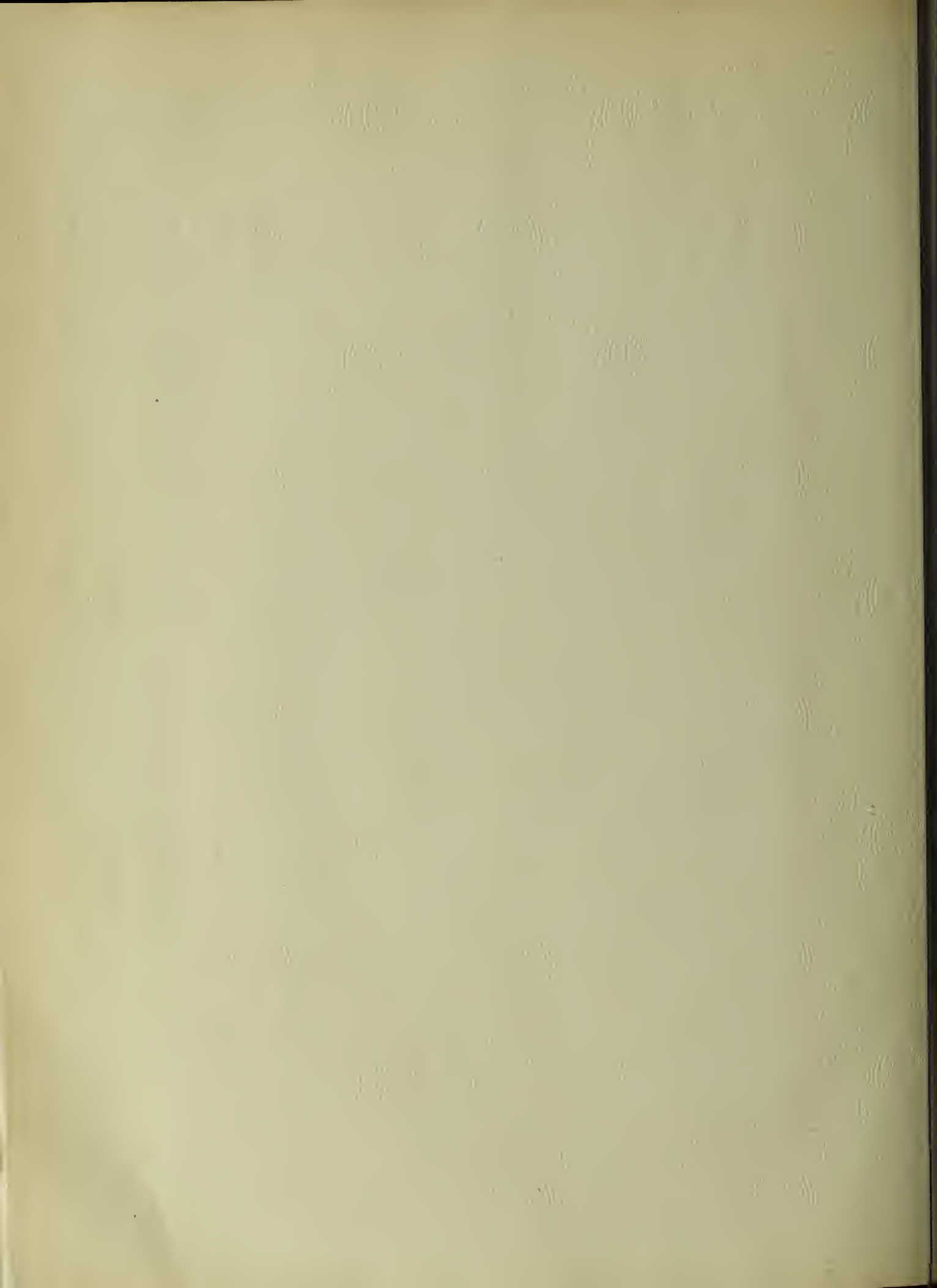




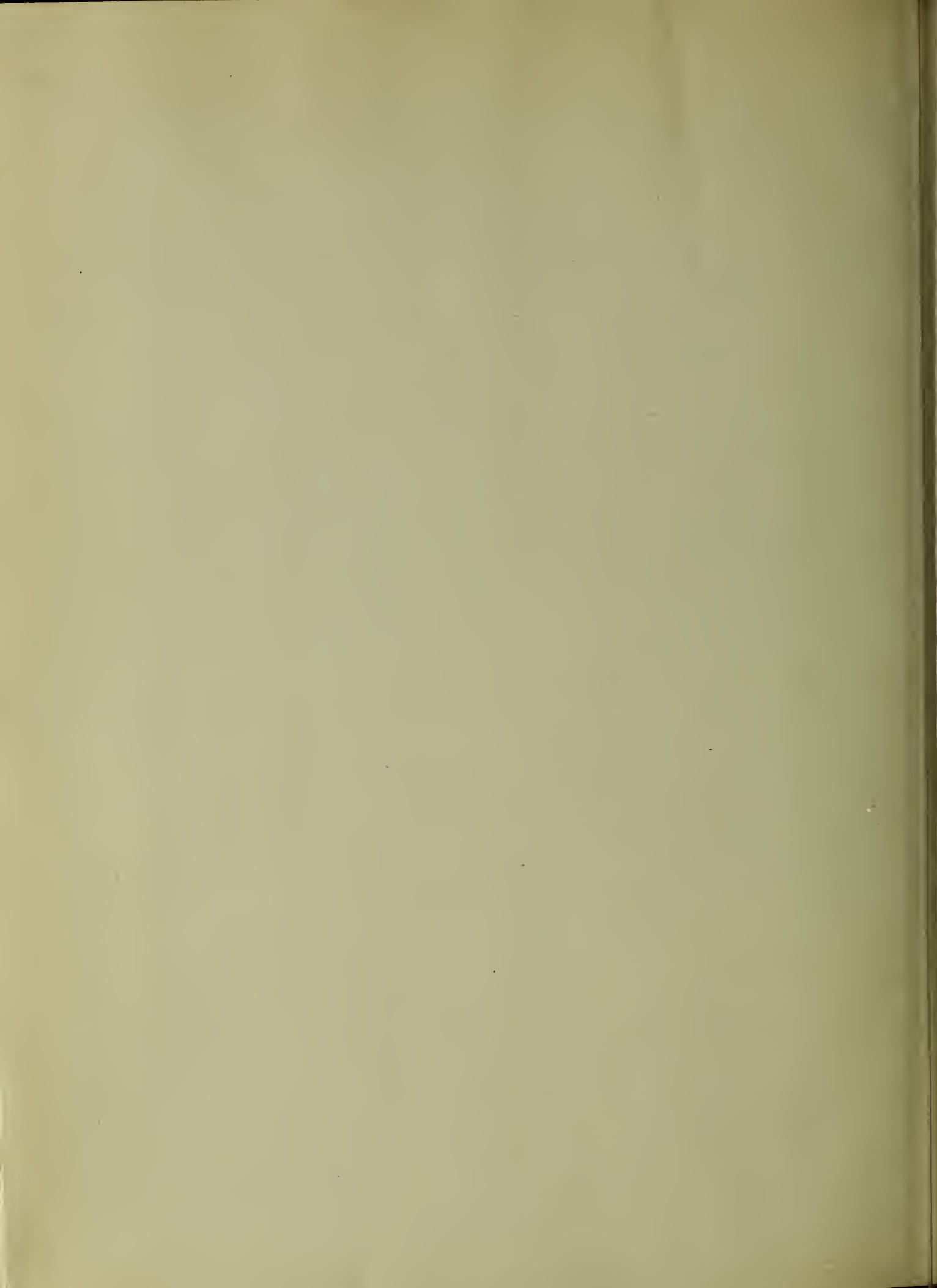










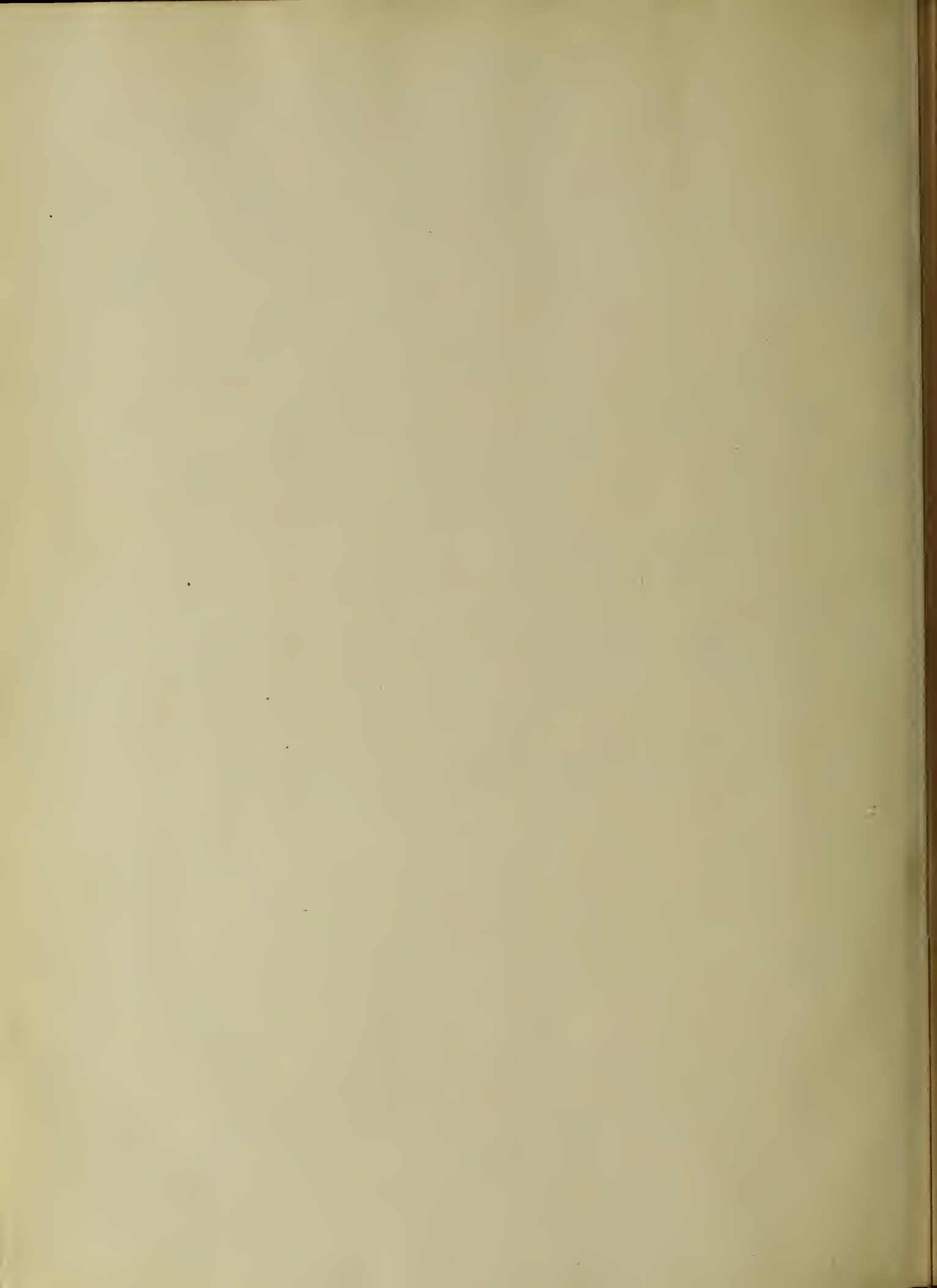












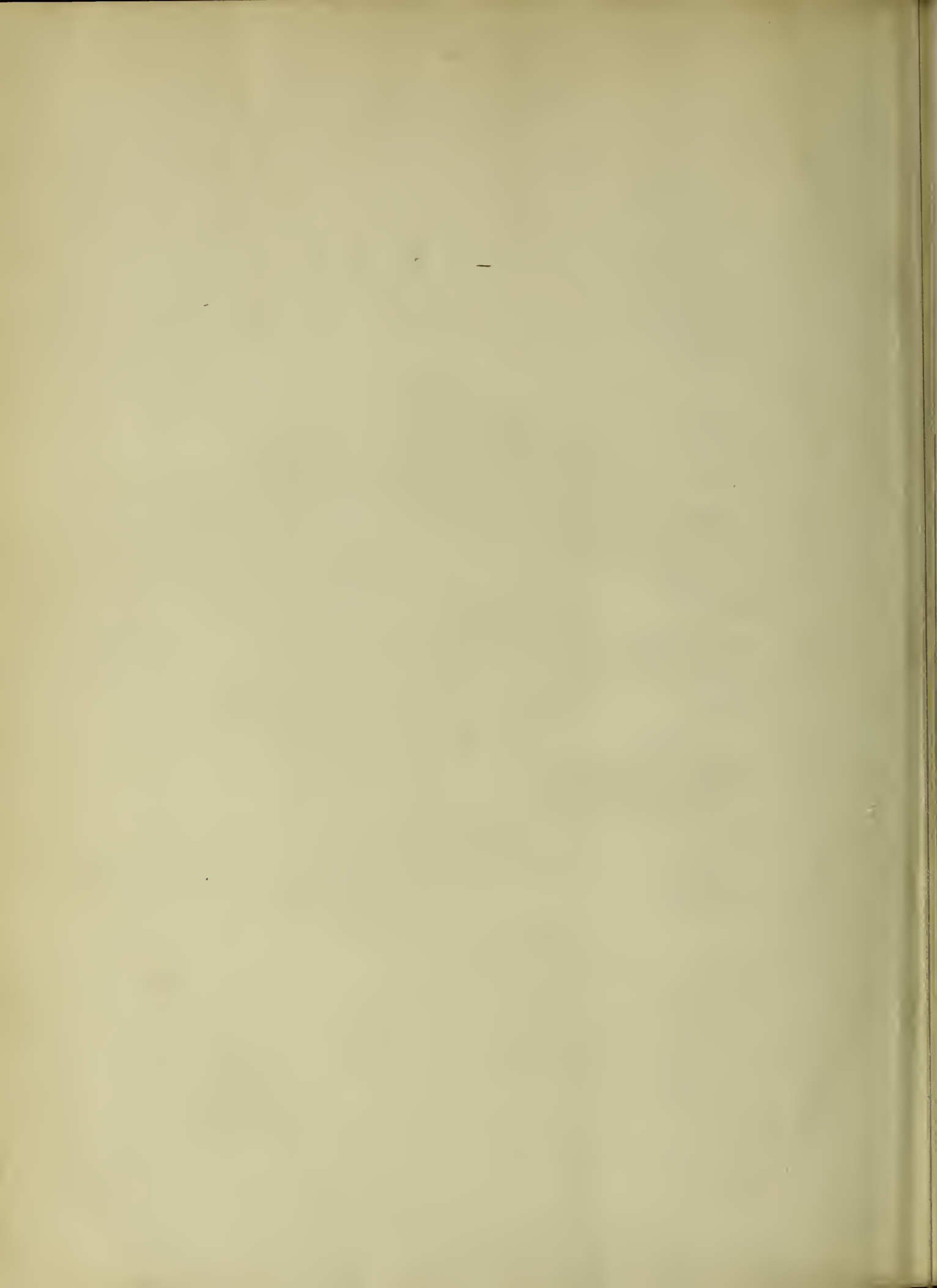




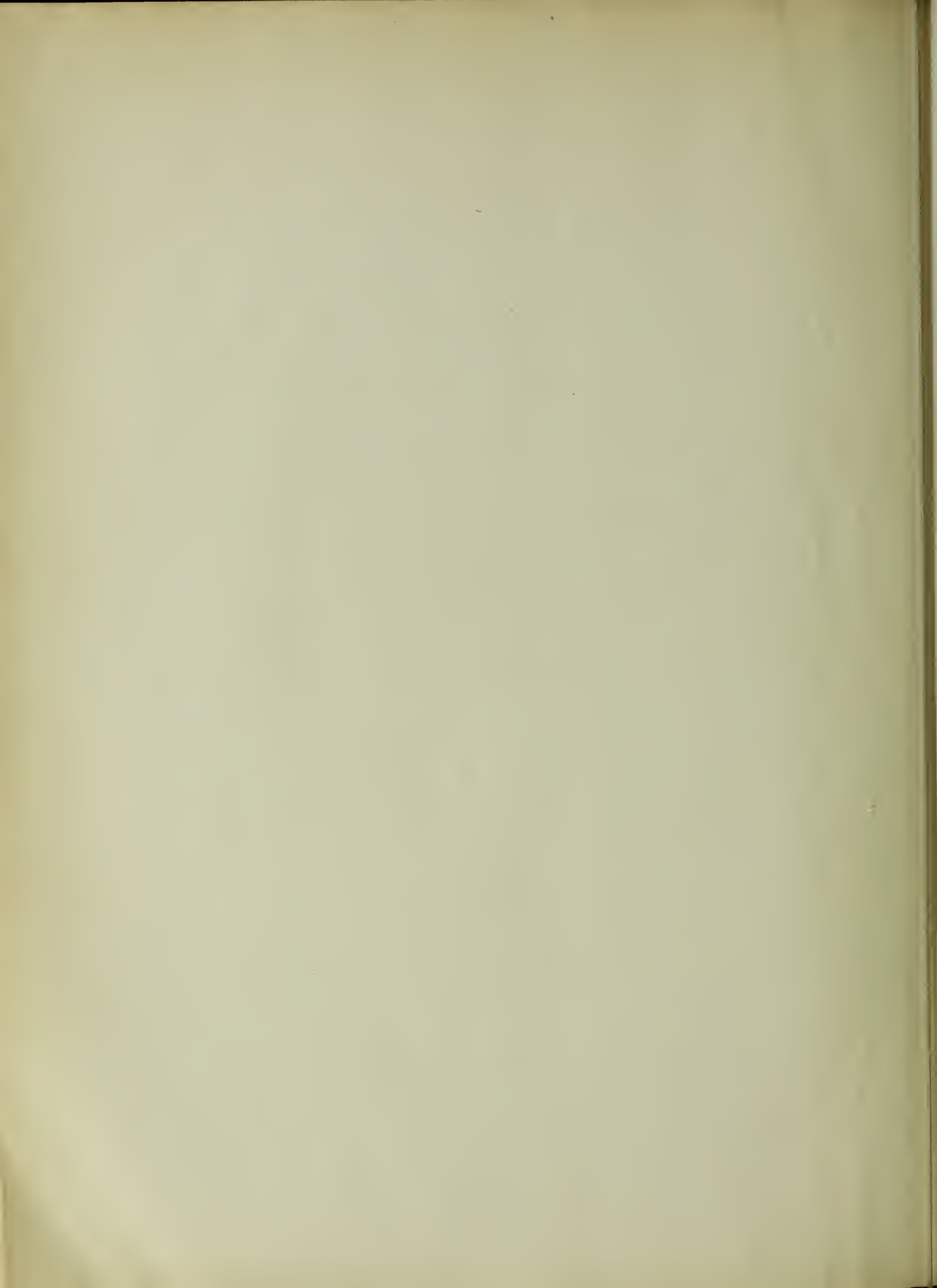












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# Introduction

By J.

The purpose of this book is to provide a comprehensive overview of the current state of research in the field of artificial intelligence.

This book is intended for researchers and students in the field of artificial intelligence, as well as for those interested in the applications of artificial intelligence in various domains.

The book is organized into several chapters, each covering a different aspect of artificial intelligence. The chapters are as follows:

1. Introduction to Artificial Intelligence

2. The History of Artificial Intelligence

3. The Current State of Research in Artificial Intelligence

4. The Applications of Artificial Intelligence in Various Domains

5. The Future of Artificial Intelligence

6. Conclusion

Chapter 1

The purpose of this chapter is to provide a brief overview of the field of artificial intelligence, including its history, current state, and future prospects.

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The chapter is organized into several sections, each covering a different aspect of artificial intelligence. The sections are as follows:



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NOTES

1. The first part of the paper is devoted to a discussion of the

history of the problem and the various approaches to its solution.

2. In the second part, we shall consider the case of a

function which is continuous on the boundary of the domain.

3. The third part is devoted to the case of a function which is

discontinuous on the boundary of the domain.

4. In the fourth part, we shall consider the case of a function which is

continuous on the boundary of the domain and has a jump discontinuity

at a point on the boundary.

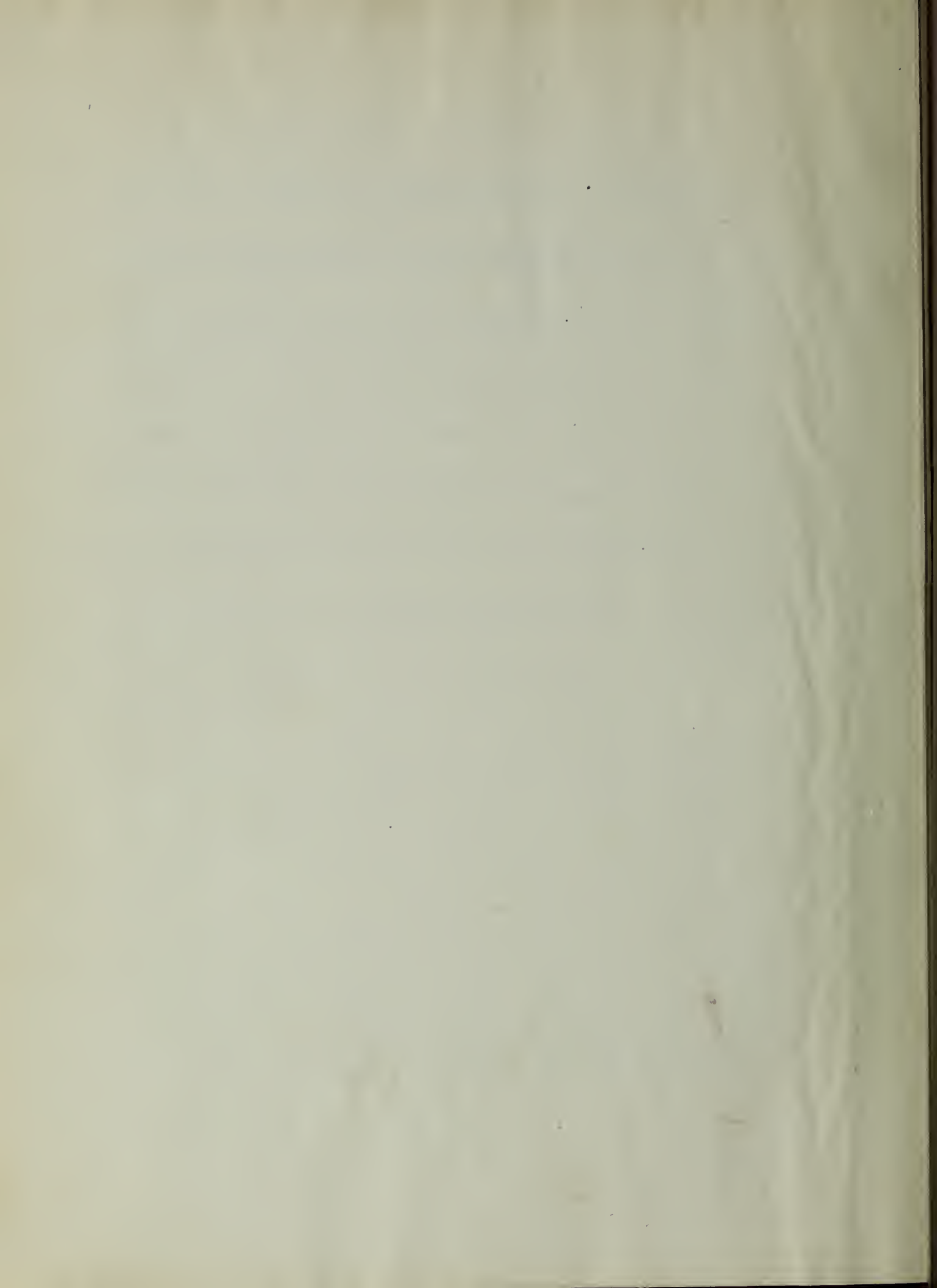
5. The fifth part is devoted to the case of a function which is

continuous on the boundary of the domain and has a jump discontinuity

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Consolidated Lithographing Corporation, Brooklyn, N.Y.  
Container Corporation of America, Medford, Mass.  
Container Corporation of America, Chicago, Illinois  
De Villbiss Company, Toledo, Ohio  
General Mills Inc., Minneapolis, Minnesota.  
Hazen Paper Company, Holyoke, Mass.  
Lebanon Paper Box Company, Lebanon, Pa.  
Matthias Paper Corporation, Philadelphia, Pa.  
National Metal Edge Box Company, Philadelphia, Pa.  
Old Dominion Box Company, Inc., Charlotte, N. C.  
Packaging Institute Inc., New York, N.Y.  
The Paraffined Carton Association, Chicago, Illinois  
Polaroid Corporation, Cambridge, Mass.  
A. H. Ross Company, Inc., Dayton, Ohio  
U. S. Automatic Machine Company, Boston, Mass.







Alevizos J.P.

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